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June 2006

Fast Track to DIGITAL AUDIO

PLAY

MAKE

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Jasubhai DIGITAL MEDIA

YOUR HANDY GUIDE TO EVERYDAY TECHNOLOGY

Fast Track to Digital Audio

By Team Digit

Credits

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Audiophilia

An obscenely large percentage of the world's population shares the same passion - music. If it isn't teenyboppers bouncing about to Britney, it's fanatical classic rockers guarding their original vinyl Led Zeppelin records with the ferocity of a mother tiger. We at *Digit* too fall into this community, and so we present to you this Fast Track to Digital Audio - everything you need to know, and some other things we just thought we'd share.

With the coming of the MP3 and file-sharing revolutions, most of us now sport music collections spanning a few gigabytes (at a conservative estimate). The first section of this book is dedicated to the most important thing you can do with this mega collection - play it! Of course, nobody likes music that doesn't sound perfect, so we've rambled on about all the gear you'll need - from high-end speakers to portable music players to the new "iPod-killing" music cell phones. You'll also learn to turn your plain old box into a Home Theatre. And don't miss our handy guide to some absolutely free music online - no tangling with the law here!

Ever thought, "I wish I could make music like that"? Do you want to get out of the bathroom and into the clubs with your own priceless compositions? The second section of this book - Make - will aid you in your quest for just that. The long journey to the best recording and mixing studios starts with but a single step, and this is it. Remix tracks from your own collection or compose your own music and even use it as a ringtone for your mobile phone - the choice is yours.

How do you bring order to the chaos of your music collection? The third section of this book will show you how you can organise that collection so that you're never hunting for that elusive song you haven't heard in a while.

And finally, the fourth section of this book will turn you into a benevolent soul - share your music collection and your own original music with the world! So lend us your ears for the duration of this book, will you?

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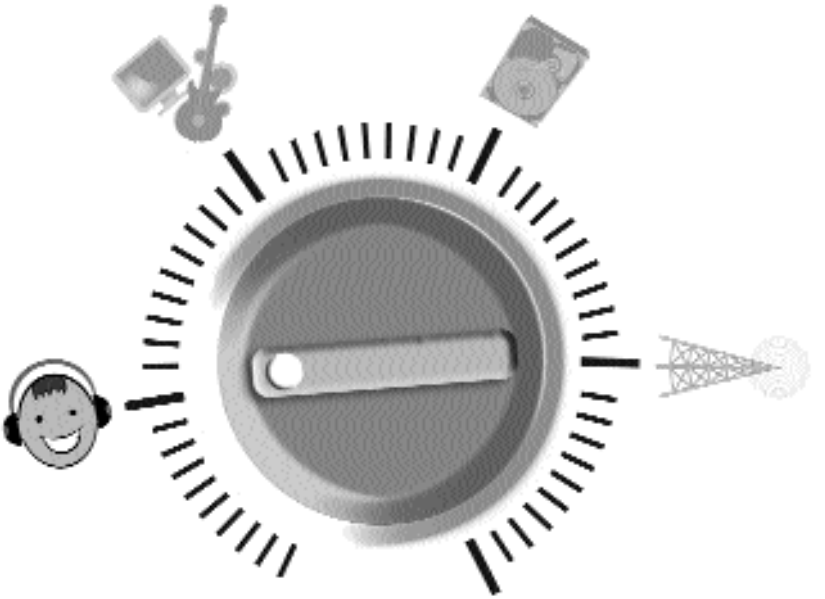


Section I

Play

Audio Gear

If you're into music, we advise you indulge your ears—spend a little bit and get the best there is! Here, we speak about what you need for your music to sound really good—sound cards, speakers, headphones, portable audio players, and phones that double up as music players. We also touch upon what you need to build a home theatre based around your PC.

1.1 Sound Hardware

When it comes to the basic PC hardware for sound, you, of course, have two options—onboard sound and dedicated sound cards. We talk about both these.

1.1.1 Onboard Sound

Onboard Sound has improved in a big way since the 2-channel solutions of a few years back. All current-gen motherboards come with at least 6-channel sound as a *de facto* standard, with the latest chipsets from the big guns such as Intel and NVIDIA actually having 8-channel audio. For example, Intel released "Azalia," which is the codename for its latest 7.1, high- definition audio specification. Other features of Azalia or Intel High Definition Audio include multi-streaming capabilities, which gives you the ability to send two or more different audio streams to different locations at the same time, from the same PC. This means you can play a game's sounds through your 5.1 speakers while simultaneously voice-chatting on the Net! Also, there is "jack retasking"—one jack can have more than one function. The motherboard can sense when a device is plugged into an audio jack, determine what kind of device it is, and change the port function if the device has been plugged into the wrong port!

Most mid-range to high-end Intel motherboards from the 925X series and up sport Azalia, although some boards use lower audio solutions, mainly due to cost constraints. Azalia is capable of support for up to eight channels at 192 kHz/32-bit quality.

The ALC 880 and ALC 880D are also 7.1-channel high-definition codecs providing four 24-bit, 2-channel DACs. This standard achieves 100 dB sound quality, making these codecs suitable for high-end multimedia PCs.

SoundMAX is a combination of Analog Devices' AC'97 CODEC series and software that enables your computer to have features that, according to Analog Devices, can even "surpass the functionality of premium soundcards at a fraction of the cost."

SoundMAX, too, features intelligent jack sensing, as well as a user interface. The AudioESP (Audio Enumeration and Sensing Process) feature of SoundMAX is an advanced jack-sensing and enumeration feature that eliminates the common connectivity problems users face when trying to match audio peripherals to their PC's I/O jacks. AudioESP notifies users of erroneously connected audio peripherals, guiding them through the process of connecting peripherals to the correct jacks. SoundMAX also offers a "virtual dashboard" that allows users to easily manage audio-related controls. In addition, it includes enhanced audio Wizards that enable users to set up audio peripherals.

The SoundMAX-class AD1985 audio codec features 6-channel sound output, variable sample rate conversion, and 103 dB output with 94 dB SNR. Acer, Intel, MSI, Gigabyte, and Asus all ship SoundMAX on a lot of their motherboards.

1.1.2 Sound Cards

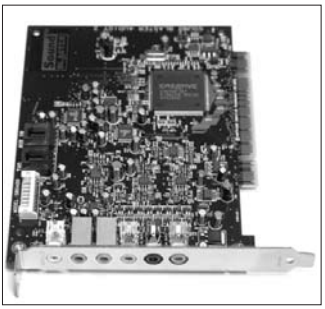
Creative makes some of the best cards in the market. At the low end of the spectrum are the Sound Blaster Live series. The mid-range sees the Creative Audigy series of cards, and if you want only the best, you have the Creative X-FI card series, the latest and best.

Live! 24-bit

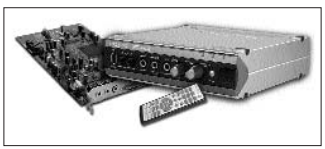
"A good, cheap card" is how the Creative Labs Sound Blaster Live! 24-bit would be best described. Creative calls it "The perfect upgrade from basic motherboard audio for enhanced music, movies, and gaming." Sound Blaster Live! 24-bit supports up to 7.1 surround, and features Creative's EAX Advanced HD technology. EAX essentially allows you to enhance your music with features including Bass Boost, a multi-band graphic equaliser, "audio clean-up," and so on. There's also an external (USB) version available. The non-USB card retails at approximately Rs 2,250.

Audigy

There are several cards in this series, ranging from the Sound Blaster Audigy Value to the Audigy 4 Pro.



Creative calls the Audigy Value "the upgrade solution for basic motherboard audio to high quality 24-bit, 7.1 audio." Audio quality is 24-bit / 96 kHz with a 100 dB SNR. The Audigy 2 Value is a minor upgrade of the same card. The Audigy 2 NX is an external USB 2.0 sound solution. The Audigy 2 ZS features Creative's 24-bit Advanced HD audio quality playback with an SNR of 108 dB, and supports DVD Audio at 24-bit / 192kHz in stereo or 24-bit / 96kHz in 5.1 surround.

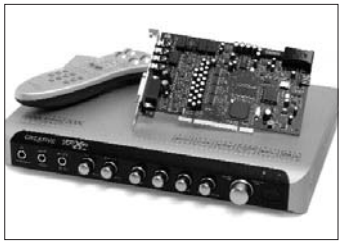


At the upper end of the spectrum is the Audigy 4 Pro, which pumps the SNR up to 113 dB, and which supports recording of six channels at 24-bit / 96 kHz. The Entertainment Center software and infrared remote allow easy navigation through movies, music and pictures. The Audigy 4 Pro has an external I/O hub that allows you to connect all your music devices at one time for studio-quality audio creation, according to Creative. The PCI card connects to the external hub, with the line outputs (three 3.5 mm stereo jacks) on the PCI card and all the other connections on the hub.

Indicative prices are about Rs 2,200 for the Audigy Value, Rs 7,000 for the Audigy 2 NX, and Rs 20,000 for the Audigy 4 Pro.

X-Fi

The Creative X-Fi is supposed to be 24 times more powerful than its predecessor, the Audigy 2 ZS, in terms of processing power. Unlike any earlier audio technology, the X-Fi Xtreme Fidelity audio processor allows the user to switch the sound processing of the card between one of three modes (Gaming, Entertainment and Audio Creation).



The X-Fi is the latest and greatest offering from Creative. There's the X-Fi XtremeMusic, the X-Fi Platinum, the X-Fi Fatal1ty, and the X-Fi Elite Pro. The Fatal1ty accelerates gaming performance with its 64 MB of onboard X-RAM, as does the Elite Pro.

As with the Audigy 4 Pro and other Audigy solutions, the X-Fi Elite Pro, Platinum and Fatal1ty consist of a PCI card that connects to an external hub that's controlled by a remote.

The Elite Pro is priced at approximately $350 in the US, the Fatal1ty is about $225, and the Platinum is about $165. As an example of the price difference for these products between the US and India, the XtremeMusic is about $110 (Rs 5,200) in the US, and is Rs 9,000 in India (street price).

1.2 Speakers

A primary consideration in deciding between 2.1 and 5.1 speaker sets is whether it's music you're intending to use them for on the one hand, or DVD movies and games on the other.

2.1 speaker sets are ideally suited for music—more so than 5.1 systems. A good 2.1 speaker set will outperform a 5.1 set in the same price range if MP3 tracks and audio CDs is what you'll be listening to. This is because most music, such as that on a regular CD, is encoded for two-channel playback. When you play these on 5.1 speakers, your sound card is encoding stereo sound into 5.1, and there is bound to be some distortion. It's pretty straightforward, really: it was recorded on two channels, so it'll sound better on two channels... The subwoofer doesn't result in too much of a distortion, because all that happens is that the low-frequency sounds get channelised to it, but hard-core audiophiles won't

stand up for even that: they'll swear that it's pure stereo speakers that deliver stereo sound best. In fact, some audiophiles swear that stereo sound is best listened to using quality headphones.

Whatever the case, our point stands that if it's stereo music (DVD Audio being an exception, since it's been recorded through more than two channels) you're going to listen to, with the occasional game thrown in, you're better off with 2.1 speakers—not to mention that if you're on a budget, 2.1 would naturally be the way to go.

5.1, like we said, is for movies—DVD movies in particular—and games. It's all about immersion and the surround experience. DVD movies that use standards such as DTS and Dolby Pro Logic IIx *need* a 5.1 system for accurate sound reproduction. And as any gamer will tell you, 2.1 systems just don't cut it—there's almost no realism if you're talking about today's immersive games!

If you're not really an audiophile and would like to be immersed in music, then again, 5.1 is the way to go. You sit in the middle of the room and the sound seems to fill the room. That's not accurate reproduction, like we said, but some folks like it that way—it's a little bit like using the graphic equaliser: you add and subtract from the sound, making it less faithful to the original, but if that's the way you like it—go ahead with 5.1!

We proceed to talk about the four best 2.1 speaker sets from our speaker shootout in the May 2006 issue of *Digit*. These are (not in any particular order) the Altec Lansing FX-6021 and MX-5021, and the Logitech X-230 and Z-2300. These are the four sets you should be looking for.

1.2.1 Speaker Sets (2.1)

Remote Controls

Both the Altec Lansing models come with wired control pods as well as wireless remote controls. There are volume, bass and treble controls on both the wired and wireless units. The Logitech Z-2300 has a wired control pod with a large volume dial and a smaller bass dial.

Stands
Stands for speakers are a welcome feature, especially for the sub-woofer. The stands on the Altec Lansing FX-6021 were of solid metal and good build quality. The stand quality of the Logitech X-230 is good, too: it also has a swivel base for wall mounting.

DVD Audio
Whether it's vocals, treble or bass, the Altec Lansing MX-5021 is the best 2.1 set we've tested as far as DVD audio is concerned.

Audio CDs and MP3s
With audio CDs, the Altec Lansing MX-5021, with its very high dynamic range, doesn't distort the sound even at high volumes. Vocals at extreme ranges are handled comfortably by this set. To put it briefly, both the Altec Lansing sets reproduce audio CD sound very well indeed. MP3s, too, play very nicely on the Altec Lansing sets.

Bass And Treble
When it comes to deep bass—as in 50 Hz—the Altec Lansing MX-5021 is amongst the best we've tested. The FX-6021, though not just as good, also reproduces bass well. And when it comes to extreme treble, the Altec Lansing MX-5021 and the Logitech Z-2300 are the best performers.

1.2.2 Speaker Sets (5.1)
Here, we mention the four best sets in our comparison in the May 2006 issue, along with their strong points.

Philips MMS 5.500 i/C
- Clear sound with DVD audio, reasonably low distortion
- Good performance with audio CDs
- Reasonably good MP3 playback
- Inbuilt FM radio
- Looks good
- Costs just Rs 5,000!

Philips HTR5000

- External decoder/splitter for DTS and Dolby Pro Logic II
- Looks great, with narrow subwoofer and satellites with horn-like micro drivers
- Reasonably good for gaming
- Excellent DVD performance. Clear sound with hardly any distortion: flat bass; highs and ambient sounds faithfully reproduced
- Good audio CD reproduction
- Reasonably good MP3 playback
- Inbuilt FM radio
- Reasonably priced at Rs 13,000

Logitech Z-5500D

- External decoder/splitter
- Decoder is capable of a sampling rate of 96 KHz at 24-bit
- Large subwoofer (10-inch driver); 187 watt RMS; excellent low bass reproduction
- Control pod / decoder has a blue backlit LCD panel
- Good DVD playback; excellent treble, vocals and bass
- Some of the best audio CD and MP3 sound we've heard
- Fully THX-certified
- Probably one of the best 5.1 sets out there if cost (Rs 28,000) is not a constraint

Creative Inspire GD580

- Fully THX-certified
- External Dolby decoder/splitter
- Good DVD playback, but bass lacks punch

1.3 Headphones

Most of us make the mistake of thinking that it's only through speakers that you can *really* listen to music. The fact is that the high-end headphones of today, though expensive, reproduce sound with such high fidelity that your experience with one of them might make you a convert! Two points are in order here:

- Using the headphone amplifiers we'll talk about, your hi-fi headphones can actually sound like speakers, with all the spatial effects.
- Sealed and noise-cancelling headphones are great for commutes and such, and also when you want to listen to music with *no* ambient sound. These are especially useful in situations when you cannot afford to pump up the volume on your speakers, such as when you're listening at night.

Here we talk about four headphone sets in particular, and about headphone amplifiers in general. You can order this equipment from headphone.com and some other sites, as well as from ebay.com, but do remember the added shipping charges, as well as the import duties.

Many audiophiles argue that the best listening experience is provided by audiophile-grade headphones, *not* speakers! Audiophile-grade headphones tend to be "open" headphones. Open headphones allow the sound waves to propagate away from the ear freely. This means you're not isolated from outside sounds, and besides, sound through open headphones can be easily heard by others in your vicinity. But as a result of their open nature, they sound more "expansive" due to the lack of resonance: the sound isn't cramped between your ear and the headphone cap.

To expand on this further, the closed headphones you're probably used to, are sealed, which attenuates the sound waves that propagate away from the ear. The reproduced sound is therefore not nearly as accurate. The sealed chamber that is created reduces the "soundstage"—the area between two speakers that appears to

the listener to be occupied by sonic images—and creates an artificial boomier bass effect. It's all intuitive, actually: imagine your ears surrounded and enclosed by cups (closed headphones), and imagine a "ventilated" situation (open headphones). The latter will, of course, sound more natural.

Sennheiser HD650/HD600

Sennheiser is one of the most respected names in headphones, and their headphones are amongst the world's best. The HD650 is their top-of-the-line model, and the HD600 is almost the same. These currently retail at $400 (Rs 19,000) and $300 (Rs 14,000) respectively.

The HD600 and HD650, in comparison to other open audiophile headphones, are somewhat partial to treble. When you listen to these—as also to the Grados we mention next—trust us, you'll hear sounds in your music that you never knew existed!

Grado RS-1

Grado is another very respected name in headphones, though not as well-known as Sennheiser. Audiophiles are a very vocal lot, and will speak endlessly of the virtues of the phones of their choice. There are many who believe the Grado RS-1 is the best pair of headphones out there, barring those used in professional recording studios, which cost thousands of dollars. The chassis of the RS1 is handcrafted from cured mahogany wood! The bass, in our opinion, is better than that on the high-end Sennheisers. A four-word summary of these phones would be "breathtaking realism and detail"—but read the numerous audiophile reviews on the Internet

for yourself. After all, this is a serious investment you're going to make—this set retails for about $450 (Rs 21,000).

Sennheiser RS 140

Ah, wireless headphones! Not quite in the league of the HD650, the RS 140 is one of the best sets of wireless headphones you can get. Imagine walking around your room—and even outside your room, say in the garden, with your headphones on! The problem is that headphones in the class of the two we've mentioned above cannot be made wireless, so you'll have to settle for something less than perfect. However, what we mean by "perfect" here is "somewhere in heaven," and it's much more than likely that you'll love this set more than the 5.1 speaker set you have.

The RS 140 is a closed headphone set. It features independent balance control for left/right volume adjustment, which excellent if one of your ears hears a little better than the other. The sealed ear-cup design provides a good degree of isolation and attenuation of external noise. Hook it up to your TV and listen to the news, or hook it up to your hi-fi and listen to music—without disturbing or being disturbed.

Although the RS 140 would not be a headphone for demanding audiophiles, it's a candidate for those looking for both external noise suppression and very acceptable wireless sound.

The base range is 100 metres, as stated by Sennheiser. This might vary depending on obstructions or barriers in the line of transmission from the base unit, but it should still have a decent reach inside and outside the home for the majority of users. The

phones operate for around 22 hours on a single charge. Approximate price is $200 (Rs 9,500).

Etymotic ER4-S

Sealed earphones. Trust us, there's absolutely nothing better than sealed phones such as these for your daily commute. Plug them inside your ears and you can hear nothing from the outside—*nothing!* The drivers are tiny, and if you open up the phones, you'll find something about a millimetre in diameter pumping sound into your ears—this is a marvel of technology. But alas, as you might expect, the bass is less than perfect—but you can't expect booming, thumping bass emanating from a one-millimetre orifice: that would simply be too demanding on technology! Treble and mids, however, are near-perfect, and even if you aren't in a noisy environment, the noise isolation makes for a surreal listening experience.

A further note about the bass is in order here: bass isn't just about thumping and booming. For all your lives thus far, you've probably associated bass with just that—thumping and booming. But with sealed earphones, the bass sounds different. It's very hard to describe it: one way of saying it would be that you don't "feel" the bass, you actually "hear" it. So is this more accurate reproduction? We can't say. Bass is a contentious issue, so you'll just have to listen to these phones to decide for yourself.

But how do you sample these phones without buying them? Our advice would be to take our word for it—forget about the bass

for now, and think about near-audiophile-quality sound with near-complete noise isolation. You'll absolutely love the sound, and might just ditch your speakers! This set retails at approximately $200 (Rs 9,500). Go ahead, indulge your ears!

1.3.1 Headphone Amplifiers

The phones we've talked about need amplifiers, on account of their high impedance. Some from headphone.com have a "crossfeed" feature whereby music will sound binaural. (It won't technically be binaural as in a binaural recording, but still.) Think about this: when you're listening to speakers, *both* your ears are listening to *all* the speakers. But when you're using headphones, the left ear hears only what's coming through on the left—and the same for the right ear. With crossfeed, the amplifier inserts a little time delay and feeds the *right* sound into the *left* ear, at a lower volume, and feeds the left sound into the right ear. Both your ears will therefore be listening to all the sound! You literally won't believe your ears when you turn the button on for the first time—you'll feel your headphones have "opened up," and that you're listening to speakers! It sounds much, much natural, and you'll wonder what on earth you were doing listening to terrible monaural sound for all these years!

The amplifiers are worth it just for the crossfeed switch, in our opinion. But remember that for high-impedance headphones such as the Sennheiser HD600 and Grado RS-1, you'll *need* the amplifier if you're listening from a portable music source.

Head to headphone.com and click the "Amps" tab. You'll find that those in the AirHead series (in The Mobile Line) and those in The Micro Line are reasonably affordable—for those serious enough about music, that is.

1.4 MP3 Players

Audiophiles would balk at the idea of using portable MP3 players, what with their piddling earphones and the 128 kbps bitrate that are typically packed into them. But very few of us are true audiophiles!

The fact is, MP3 players are great for the daily commute. They're good for ambling around the place with music being piped into your ears. And if you can work while listening to music, you can mix business with pleasure, as it were, while in office. They can double up as backup storage devices. In general, they're fun accessories to have! You might want to shop around for better-quality earphones than those bundled with typical MP3 players, though—you just might find something that sounds way better.

Hard drive-based players offer larger capacities, but they can't stand jerks and such—you can't go jogging with a hard-disk based player strapped to your belt! Flash-based players are smaller, both in size and capacity. The good news is that they're improving in terms of storage space. Here, we mention the highlights of two Flash-based players and two hard-disk based players, the winners in our portable audio player comparison test in the May 2006 issue.

1.4.1 Flash-based

SAFA SF-Q100

- 1 GB capacity
- Great looks
- Record CDs directly without the need for a PC; voice recording
- 3D sound and equaliser functions; excellent sound quality
- 40 mW output power - quite good
- Colour 1-inch OLED display
- Lasts 17 to 20 hours on 2 AAA batteries
- Supports MPEG 1/2/2.5/3 Layer 3, WMA, ASF

Samsung YP-D1

- 1 GB capacity
- Street Mode, which enhances listening outdoors
- Capable of detailed mids and clear highs
- 11 equaliser presets and a seven-band user-defined equaliser
- 2MP camera
- 1.8-inch display
- FM radio
- Line-in, FM, voice recording
- 20 hours rated audio battery life
- Supports MP3, Ogg Vorbis, WMA, WAV

1.4.2 Hard drive-based

Apple iPod Video (30 GB)

Much has been said and heard about the iPod Video, and we don't really need to repeat all that, but for the uninitiated, this is one of the best portable media players available. Here are some of its features.

- Very intuitive user interface
- Excellent sound quality; right mixture of bass and treble
- Great 30 GB capacity
- Audio formats supported include MP3, AAC, WAV, AIFF, MP3 VBR, Audible, and Apple Lossless
- Voice recording
- Volume limiter
- 22 equaliser presets
- Easy drag-and-drop using iTunes

Creative Zen MicroPhoto 8 GB

- 8 GB capacity
- Winner of the Best of CES 2005 award!
- Intuitive menus in bright colours
- 15 hours of playback on a single charge

- FM radio with 32 presets
- Voice recording
- Eight equaliser presets
- Decent-quality earphones
- Features a vertical touchpad

1.5 Cell Phones

Here's about five cell phones that can ably act as portable music players.

Sony Ericsson Walkman W550i
(Rs 10,000 approx.)
The W550i Walkman has FM radio and a digital music player. There are speakers on the top and the side. CD ripping software is included—you can drag and drop using the Disc2Phone software. When you turn the phone on, you're prompted with a phone or music-only option.

In addition, the W550i has a 1.8-inch colour screen, and a 1.3-megapixel camera with video recording and digital camera menus. This Walkman phone has Sony's trademark Mega Bass, as well as a stereo widening feature.

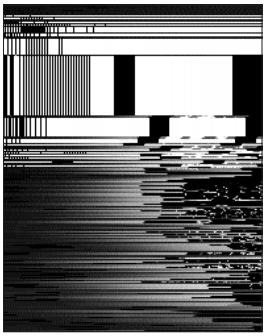
The downside is that there's only 256MB of internal memory, and no expandable memory! The phone comes with stereo headphones, and the sound from the speakers is tinny according to many users.

Sony Ericsson Walkman W800i
(Rs 18,000 approx.)
In the memory department, the W800i does better than the W550i, with a 512 MB

Memory Stick PRO Duo included. Of course, you can put in a larger Stick if you choose. There's FM radio on this phone as well, and also CD ripping software. When you turn the phone on, you're prompted with a phone or music-only option.

Sony Ericsson K750i

(Rs 13,500 approx.)



Dedicated buttons for play/pause and volume control enable you to listen to music without entering the menu at all during playback, and press-and-hold functionality also enables track skipping. Although the phone has the ability to create playlists is present, there's no way to forward through songs without entering the music player interface. There's a graphic equaliser with several presets. Unfortunately, the K750i doesn't provide an integrated 3.5 mm stereo jack, but relies on a dongle that must be purchased separately.

Nokia N91

(Rs 38,000 approx.)

The N91 has an integrated 4 GB hard disk—good enough for most music lovers. Nokia has integrated a 3.5 mm stereo headset jack into the handset, negating the need for cumbersome dongles. Audio quality is reported to be superb. Format support includes MP3, AAC, WMA and M4A, and there's also an included stereo headset with remote control. The N91 comes with a dedicated application for music management.

The N91 pauses music playback when receiving incoming calls and resumes playback upon hanging up.

There are dedicated volume controls, as well as an 8-band equaliser, and the ability to record music through a line-in connector or from the FM radio.

Nokia 3250
(Rs 16,500 approx.)
Although not as capable as Nokia's best music phone, the N91, the 3250 is a good enough music phone, with reasonably good audio quality and decent music management. It's very short on storage, with only 10 MB onboard, requiring any use at all to be backed up by miniSD cards. It also lacks a 3.5 mm stereo earphone jack.

1.6 Setting Up Speakers

Setting up 2.1 speakers requires no more than a couple of tips to explain:

- If your speakers are widely spaced apart, angle them towards each other, and if they are placed close together (which they would if you have limited space), angle them away from each other.
- Place the subwoofer facing a wall for better bass. If the bass seems too much, move it a little away from the wall.
- Your speakers should be roughly at ear level. Use speaker stands if you need to.

Now consider 5.1 speakers.

- You should be facing one of the longer sides of the room for the speaker arrangement.
- All the speakers should be at least a foot from the walls.
- The speakers should be mounted at approximately ear level. Even if they can't be, they should all be at approximately the same height. Some people say the rear speakers should be a little *above* ear level—experiment with this.

- All the speakers should point at where you're sitting. But there's a difference of opinion as to how far they should be from you. Most agree that the front and centre speakers should be at the same distance from you. But while some say that the rear speakers should also be at the same distance, some say they should be a bit further away. Experiment!
- Place the front speakers in an equilateral triangle with your seat, and closer to your seat than the TV or monitor is. Angle them inwards by about 30 degrees so that most of the sound seems to be coming from the monitor or TV.
- Place the centre speaker on the monitor or TV, or somewhere in the TV cabinet, hopefully at ear level.
- The subwoofer can be placed anywhere convenient, but it's generally considered better to place it near the front. But experiment with it such that you can't make out where it is when music is playing. For better bass, place it somewhat close to a wall.
- Place the rear speakers behind and to the sides of the viewing seat. The spacing between them should be about double the spacing between the front speakers. Since they're so far apart, the principle we stated in the case of 2.1 speakers holds—angle them towards each other.

1.7 Setting Up A Home Theatre PC

If you're about to buy a PC now, think about a home theatre—your PC doesn't have to be stuffed away in your bedroom; you can bring it out into the living room and, coupled with a DLP projector and great 5.1 speakers, turn it into a complete home theatre solution. Here's what you'll need.

Processor, motherboard, power supply: For the processor, we'd recommend an AMD 939-pin Athlon64 3800+ or a dual-core Athlon X2 4400+. For the motherboard, consider the PCIe Asus A8N-VM CSM. It's based on the NVIDIA GeForce 6150 + nForce 430, has support for dual-channel DDR400 RAM, an integrated GeForce6 GPU, dual VGA output—DVI-D and RGB, NVIDIA Gigabit LAN with

NVIDIA ActiveArmor Firewall, and SoundMAX High Definition Audio.

Get a 400-watt power supply from Antec or VIP.

RAM and hard disk: You need at least 512 MB of DDR RAM. We'd recommend no less than 200 GB for the hard disk, and we recommend Western Digital because of its performance in our tests.

DVD-Writer: Since you'll be handling a lot of audio and video, you obviously need a DVD-Writer. We recommend either Sony or Lite-On.

Coming to the audio and video,

Sound Card: Recommended for a home theatre is either a Creative Audigy or, if you have the money to spare, a Creative X-Fi XtremeMusic. See §1.1.2 for more.

Speakers: We recommend the Logitech Z-5500D, if price is not a constraint. If it is, you can make do with the Philips HTR5000. For how to set up 5.1 speakers, refer to §1.6 and also the workshop in the magazine.

Projector: The Sharp XR-10S, an 800 x 600 DLP. It retails at Rs 70,000 approx. For how to set up a projector, refer to the workshop in this month's anniversary issue.

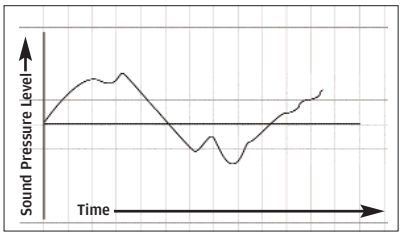
Formats

There are some terms you'll very often come across in digital audio—for example, sampling rate. And then there are the various audio formats. This little chapter will prepare you for what's to come in the later chapters, by way of a brief introduction to terms and formats.

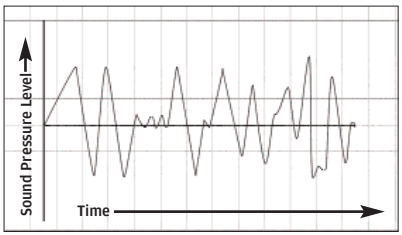
2.1 Sampling Rate, Quantisation, Bitrate

Music (or any sound sequence) is composed of many different frequency signals. A single tone—say the beeps you hear when you get an engaged tone during a phone call—is a single frequency, rather, a non-continuous signal composed of a single frequency. Now, when you listen to one second of music, you're listening to several signals of different frequencies at the same time. Now, music is complex—don't think that a drumbeat (which may sound monotonous by itself) is a single frequency: it's actually composed of signals of many frequencies.

Now think of a signal of a single frequency (of which there are many in one second of music). In the analogue world, this is drawn as a *waveform*, and looks something like this:

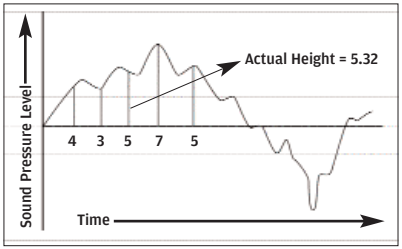


Music is composed of a lot of these together. When you look at the spectrum analyser (the light bars moving up and down), remember that what they're showing you is how loud each of the frequencies is in the music that's being played. When there's a crash of cymbals (lots of treble, or high frequencies), the high frequencies like this one below become more pronounced, and the lights on the right go up.



Now, how is this converted to digital? What we mean by digital is ones and zeroes; so how is a shape like this represented as ones and zeroes? The answer is simple, but read on carefully: what does the waveform

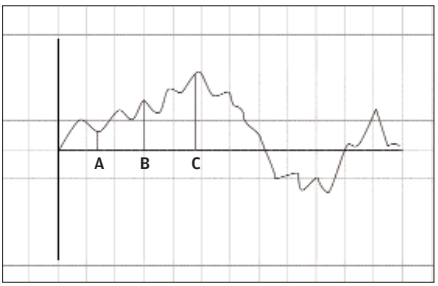
above represent? It can represent the voltage, or sound pressure level, or loudness, of that frequency. Essentially, the vertical level of the wave represents *how much of this frequency is present in the music.* So, we "look" at the wave continuously—several times per second—and note the value (the height). Each time we look at it, we represent the height by an approximation. This is called quantisation.



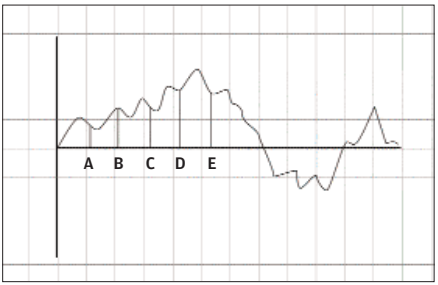
In the image above, the actual height may be 5.32, but we represent it as 5. The 0.32 is the "quantisation error."

So where does the "digital" come in? It's simple: that "5" is represented digitally, as "101". (If it were indeed "5".) Now, the more the number of levels we define for our representation, the more accurate our representation will be. Say we have only 10 levels, from 1 to 10. Then 5.3 would be coded as 5, 6.8 would be coded as 7, and so on. But say we have 20 levels. Then 5.3 would be coded as 5.5, 6.3 would be coded as 6.5, and so on. We're getting more accurate. Now, representing 10 levels only needs four bits; representing 20 levels requires five bits.

We can now define the sampling rate and bitrate. The sampling rate (the "44.1 kHz" you see in Winamp or any media player when a clip plays) is the number of times the waveform is "looked at" per second. A low sampling rate means we only look at the waveform at points A, B, and C above.



A high sampling rate means we look at it more times per second, at points A, B, C, D, and E, as below:



The bitrate is the number of bits used to hold the data captured every second. Music is sampled at rates like 44.1 kHz, with 16 bits or 24 bits (or so) used to hold the data *at each sample*. So the bitrate of music sampled this way would be

44,100 x 16 x 2 = 1,411,200 bits per second, or 1,378 kbps, or 1.35Mbps.

Some typical sampling rates:

44.1 kHz CD, DAT

48 kHz DVD-Video, DV camera, DAT

96 kHz DVD-Audio

2.2 Your MP3s: Good Enough?

Consider this: cymbals (our reference point for high frequencies!) can be as high as 10 kHz (our ears can hear sounds between 20 Hz and 20 kHz). Now, think of the sampling as the frames in a movie, which, as you know, are usually taken 24 times a second. That is, there are 24 frames that you see every second. If we're sampling the cymbals at 44.1 kHz, only approximately four "frames" per second are representing the cymbals. In contrast, the human voice is somewhere around 1 kHz, and that's 40 "frames" per second. Hence, high frequencies need a higher sampling rate to be represented more accurately in the digital format.

Now, what we mentioned above—44.1 kHz sampling at 16 bits—comes to 1378 kbps. That's something like CD quality (though strict-

ly speaking, CD quality comes to 2 Mbps or so, because of additional bits required for error correction and metadata), but your MP3s are typically 128 kbps! Even 256 kbps comes nowhere close to 1378 kbps.

Why, then, do 128 kbps MP3s sound OK? It's because of certain limitations—not everyone can listen very well beyond 10 kHz, and not everyone can make out fine gradations: it's about sensitivity. Yes, some people can indeed make out the difference between 128 kbps MP3s and 256 kbps MP3s, and between these and CD quality. But then, as you've inferred, a higher bitrate means more space required on your hard disk or MP3 player—so it's a trade-off.

Talking about MP3, we move on to a discussion of digital audio formats: uncompressed, lossless compressed, and lossy compressed (MP3 falls in the last category because the 128 kbps means that the remaining bits are forever lost. Remember that if you rip a CD to MP3 and then throw the CD away, you *are* actually throwing something away!)

2.3 Uncompressed Formats

WAV (or WAVE)

This is a Microsoft and IBM audio file format standard for storing audio on PCs. It happens to be the native digital audio format in Windows. In WAV files, 8-bit or 16-bit samples are taken at rates of 11 kHz, 22 kHz or 44.1 kHz. The highest quality (16-bit at 44.1 kHz) uses 88 KB of storage per second of music. The WAV format is widely used as the medium for professional recording and editing. For creating audio CDs, WAV files are converted to the CDDA audio format. Both CDDA files and WAV files at their highest sampling rates take up a similar amount of storage space, and are not compressed (like MP3 is). But WAV is not the same as CDDA, as some people believe.

AIFF

Audio Interchange File Format is another format used for storing digital audio data. It supports a variety of bit resolutions, sample

rates, and audio channels. The format is very popular on Apple platforms, and is widely used in professional programs that process digital audio waveforms. The format was co-developed by Apple Computer based on Electronic Arts' Interchange File Format (IFF). There is also the AIFF-Compressed (AIFF-C or AIFC) format, which supports compression ratios as high as 6:1.

AIFF is one of the two most-used audio file formats on Mac operating systems. The other is Sound Designer II (SDII).

The extension for AIFF is .aif when used on a PC.

AU

The .au file format, originally by Sun, isn't widely supported outside the UNIX community. "AU" is short for "audio." It is the standard audio file format for the Java programming language.

2.4 Compressed Lossless Formats

Lossless compression is a compression technique in which data can be decompressed back to its original form without any loss. The decompressed file and the original are identical. For example, ZIP is used to compress documents etc.; there are similar compression techniques for audio and video. Apple Lossless, WMA Lossless and FLAC are examples of lossless compression applied to CD audio. These methods can reduce a full audio CD only to about half its original size.

A word about containers is in order here. A container format is a file format that can contain various types of data, compressed in a manner of standardised codecs. The container file is used to be able to identify and interleave the different data types. Simpler container formats can contain different types of audio codecs, while more advanced container formats can support audio, video, subtitles, chapters, and metadata, along with the synchronisation information needed to play back the various streams together.

Apple Lossless

Also known as Apple Lossless Encoder, ALE, or Apple Lossless Audio Codec, ALAC, this is an audio codec developed by Apple for lossless compression of digital music. Apple Lossless data is stored within an MP4 container with the filename extension .m4a. Apple claims that audio files compressed with its lossless codec will use up "about half the storage space" that the uncompressed data would require. Testers have found that compressed files are about 60 per cent the size of the originals, similar to other lossless formats. Compared to most other formats, Apple Lossless is not as difficult to decode, making it practical for a limited-power device such as an iPod.

FLAC

An acronym for Free Lossless Audio Codec, this is a popular format for audio compression. It is suitable both for everyday playback and for archiving audio collections. It was developed by the Xiph.Org Foundation (www.xiph.org), and is royalty-free.

WMA Lossless

Windows Media Audio actually is the name of Microsoft's solution for digital audio. WMA codecs once were only lossy, but with the release of Windows Media Encoder 9 Series in early 2003, Microsoft provides the option of lossless compression by Windows Media Audio 9 Lossless codecs. WMA Lossless is, formally, a digital audio file format that compresses an audio CD to a range of 206 to 411 MB, at bitrates of 470 to 940 kbps. It uses the same .WMA file extension as other Windows Media Audio formats.

2.5 Compressed Lossy Formats

Such formats permanently discard data to achieve reduction in file sizes. But to most ears, music in such formats is good enough for everyday listening.

MP3

A number of techniques are employed in MP3 to determine which

portions of the audio can be discarded. MP3 audio can be compressed with different bitrates, providing a range of tradeoffs between data size and sound quality. Typically, rates chosen are between 64 and 320 kbps. (Remember that uncompressed audio as stored on a CD has a bitrate of 1411.2 kbps (16 bits/sample x 44100 samples/second x 2 channels). With too low a bit rate, "compression artefacts"—sounds that were not present in the original recording) may appear in the reproduction.

MP3 Surround, a version of the format supporting 5.1 channels for surround sound, was introduced in December 2004. MP3 Surround is backward compatible with standard stereo MP3, and file sizes are similar.

WMA

Windows Media Audio files are supposed to offer the same audio clarity level when you encode a piece of music at 96 kbps that MP3 does when it is encoded at 128 kbps. WMA is a proprietary compressed audio file format developed by Microsoft. It was initially a competitor to the MP3 format, but with the introduction of Apple's iTunes Music Store, it has positioned itself as a competitor to the Advanced Audio Coding format used by Apple. WMA is part of the Windows Media framework. WMA is second only to MP3 in popularity in terms of number of devices supported.

AAC

Advanced Audio Coding (AAC) is also known as MPEG-2 Part 7. It was popularized by Apple through its iPod and iTunes Music Store. AAC was designed as an improved-performance codec relative to MP3.

Apple is doing a lot to promote AAC, and here's a snippet from Apple's site about the format:

- AAC provides audio encoding that compresses much more efficiently than older formats, such as MP3, yet delivers quality rivalling that of uncompressed CD audio.

- When compared side-by-side, AAC proves itself worthy of replacing MP3 as the new Internet audio standard. Take a look at these AAC advantages over MP3:

- Improved compression provides higher-quality results with smaller file sizes

- Support for multi-channel audio, providing up to 48 full frequency channels

- Higher resolution audio, yielding sampling rates up to 96 kHz

- Improved decoding efficiency, requiring less processing power for decode
- In numerous comparison tests, AAC comes out on top. Check out these impressive results:

- AAC compressed audio at 128 kbps (stereo) has been judged by expert listeners to be "indistinguishable" from the original uncompressed audio source.

- AAC compressed audio at 96 kbps generally exceeded the quality of MP3 compressed audio at 128 kbps.

Ogg Vorbis

Ogg is a patent-free container format designed for efficient streaming and file compression (storage). "Ogg" refers to the file format which includes a number of separate independent open source codecs for audio, video and text (such as subtitles). Because the format is free, Ogg's various codecs have been incorporated into a number of different free and commercial media players.

"Ogg" also often refers to the audio file format Ogg Vorbis, that is, Vorbis-encoded audio in an Ogg container. Vorbis is a lossy audio compression (codec) project headed by the Xiph.org Foundation. It is frequently used in conjunction with the Ogg container and is then called Ogg Vorbis. Although the Vorbis format is often simply referred to as Ogg, this is technically incorrect as Ogg is a container format while Vorbis is an audio codec.

2.6 What Format Should I Use?

To the extreme audiophile, even a CD doesn't sound as good as analogue. But since we're talking digital audio here, what audio format is best suited for ripping your CDs into? For some people, it makes no difference—128 kbps MP3s sound as good as anything else, especially when they're listened to on lo-fi equipment with lo-fi earphones. But the more discerning amongst us are concerned about formats, while still wanting to save space on their hard disks or portable audio players.

There's a large variation in how people perceive music, and the best way to figure out what format you want to use is to experiment by yourself, encoding at different bitrates. But still, here's one reviewer's take we found on crutchfieldadvisor.com:

"The question before the aspiring digital music enthusiast is, which format sounds the best? The market abounds with portable MP3 players, almost all of which are compatible with MP3. Most can also play WMA; some can handle AAC files. Most players decode and play back files directly from their original file format, but some portables come with software that transcodes files into a separate format, which is then read by the player. But in either case, the quality of the sound that reaches your ears depends on, among other things, the quality of the codec you used to save the music to your hard drive in the first place. So I decided to set up a listening test to find out which of those codecs would come out on top in terms of sound quality.

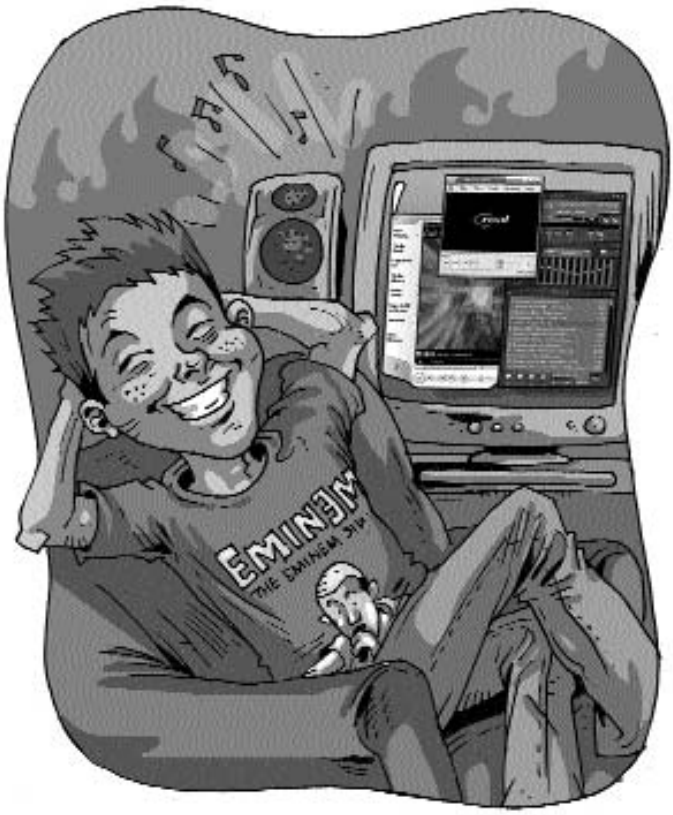
"The low-bitrate MP3 was everyone's least favourite. One listener noted a lack of overall detail, as well as 'metallic artefacts' replacing the high frequencies.

"Secondly, I was surprised to find that the uncompressed file did not receive the highest rating—that honour went to the high-bitrate AAC file. Perhaps I should have expected this since, in an earlier attempt at a listening test that pitted 96 kbps, 128 kbps,

and 160 kbps files against each other, my co-workers had a much more difficult time finding differences in the sound quality. Apparently, given the limitations of a computer-and-headphones listening environment, the differences between high-bitrate sound files and uncompressed audio are too subtle for most listeners to easily notice. Still, the high-bitrate AAC file was clearly preferred over its MP3 and WMA counterparts—a testament to AAC's effectiveness.

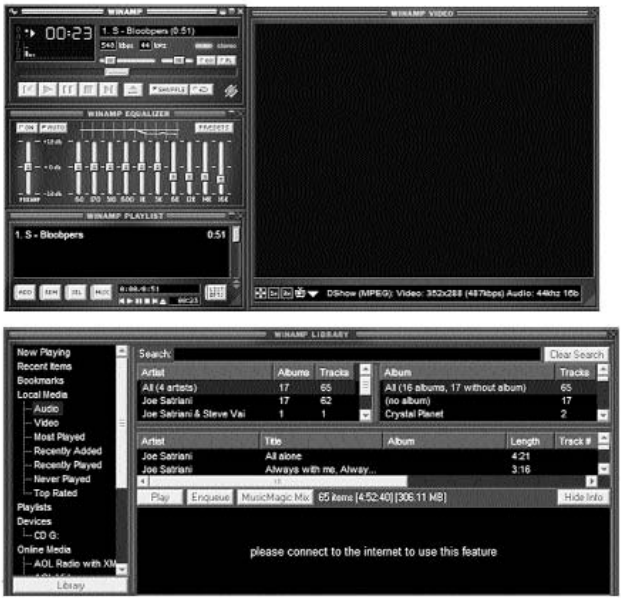
"WMA performed well, too, edging out AAC at the lower bitrate. (It was interesting) to find that the 64 kbps WMA file received the exact same average rating as the high-bitrate MP3 file. So, would my co-workers who listen to 128 kbps MP3s be just as happy with their music's sound quality if they saved it in WMA format, in a file taking up half the hard drive space? It appears so—although it's important to note that results may vary depending on the genre of music they're listening to, as well as the encoding software they use to compress the music."

Players



There are many media players out there—you might have discovered one for yourself that you like; if you have, stick with it! If, however, you're new to playing around with audio on your computer, we present here a brief introduction to three of the most popular media players there are. Note that all these can also play video, but we'll be talking about them in terms of audio.

3.1 Winamp



Winamp's classic skin—is rather bare-bones. The components—main window, equaliser, playlist, Media Library, and video window—are dockable

Winamp is one of the most versatile media players around. It supports all the popular audio formats, some via downloadable plugins. Plugins give the basic player almost any functionality you might require. Visit www.winamp.com/plugins. The plugins are in six categories, which we'll get into in a while. Here is a brief introduction to some of Winamp's features. We encourage you to explore all the menus—one great thing about Winamp is that it explains most options. For example, under Preferences > General Preferences > Plugins > Input, when you click on a plugin, there's an About button that gives you information about it.

On the front panel, you'll see, amongst other things, the preamp and the graphic equaliser. The preamp is something most

other media players don't have; it's something like a volume control for the equaliser. When you turn it right up, all the frequencies you control using the equaliser are pumped up, and the effect of sliding a particular frequency up or down will be more pronounced. Another setting you might not know about is the "Auto" button: when you do a trial and error and come upon a setting that's perfect for a particular song, select Presets > Save > Auto-load preset... The next time that song plays, the equaliser settings you chose to Auto-load will, well, automatically load.

When you right-click anywhere in Winamp (except on a song in a playlist), you'll come across Options > Preferences. There's a ton—and we mean a ton—of options here, probably more than in other media players. For example, one setting you won't see in other players is "Priority class"—the higher this setting, the more the CPU power Winamp will use. Keep it at Idle or Normal for most purposes; if you have a slow computer, and opening a document makes a track "skip," you might want to change it to High. (Track skipping is audible as a small break in the playback.) "Realtime" is not recommended unless your tracks keep skipping all the time.

Under Plug-ins > Input, look at Nullsoft MPEG Audio Decoder 3.5. This is what decodes your MP3s so Winamp can play them. The first tab lists "Full file buffering"; set this to a high value if you want your MP3s to be placed entirely in RAM and play from there. This setting is useful if you have a lot of RAM. Then there's the option between logarithmic and linear for the equaliser. "Logarithmic" (the default) is the opposite of "exponential," and means that increasing a certain frequency boosts it by just a reasonable amount. Setting it to "linear" will enable more drastic playing around with the equaliser settings—setting a particular control higher will make more of a difference than if it's set to logarithmic.

Winamp, like Windows Media Player and RealPlayer, has an inbuilt Media Library that holds all your music. Rather, it keeps track of your collection. From the menu on the left, you can book-

mark items just like in a browser, view recently played and most-played items, and so on. (Winamp keeps a track of what you've been playing!) At the top, you can search for items in the library. Here, explore the "Metadata reading settings," even though it's been reported to be buggy (as of now). This is a button at the bottom of the Watch Folders tab. Metadata is added to files by certain programs, for example iTunes, and is basically information about the file such as album and length and so on. Once you press Configure, the options are self-explanatory—you can, for example, choose to "smartly" detect metadata such as track number, artist and title. This is useful when you have too large a music collection, and don't want to go through each song and manually look at what it is. So if you've synced with someone else's iPod (yes, you can sync devices to Winamp), it can display song information you haven't even entered.

Talking about song information, when a song in the playlist is in focus, pressing [Alt] + [3] takes you to the ID3 tag information window for the song. If you downloaded a song, you'll probably see information about the song here, such as artist, album, and so on. If you ripped a CD of yours, the information can be automatically entered here by your CD ripping program if you're connected to the Internet, and choose something like "Enter information from CDDB" in the ripping program. CDDB is a database on the Internet that holds information about almost all commercial CDs, and it'll seem like magic at first—all information about the songs in your CD comes is automatically entered into Winamp!

Of course, if you didn't use the CDDB option, or if a downloaded song doesn't have any information associated with it, you can manually enter the information in the fields in the ID3 tag window. It's a good idea to have your songs marked up this way, because they become easier to search through via the Media Library.

If you want songs to play continuously without a gap, here's a way: go to Plugins > Output > DirectSound output (or waveOut, as

the case may be), and click Configure. What you need to change is the "Buffer-Ahead on track change." If you set the Buffer-Ahead to 5000 ms, Winamp will begin reading the next track when the current track has five seconds left, allowing for a smooth transition. If, however, your computer is low on memory, you're better off leaving this setting at the default.

Another interesting setting here is Fading, in the Fading tab. It's irritating to have a song end abruptly, and you can control that here. There are too many options for us to discuss here, but suffice it to say that you can control every aspect of fading you can think of—including whether or not to fade while you're seeking, that is, moving the slider to a part of a song!

The options under Other in DirectSound (or waveOut) output are interesting. Here you'll be able to remove the silence at the beginning or ending of tracks—and you can specify what Winamp interprets as silence. You can choose to have the volume control behave in a smooth manner, and you can choose between a logarithmic and a linear volume control. This is similar to the logarithmic/linear choice for the equaliser we talked about.

Winamp has SHOUTcast support, and can ably act as your SHOUTcast client. SHOUTcast is free Internet radio—visit www.shoutcast.com: there's all the genres you can think of, and when you click on a result with Winamp on, it just plays! You can be a broadcaster as well—check the documentation on the main page for details. Of course, you can also use other media players to listen to SHOUTcast streams.

Coming to the plugins: like we said, they are divided into six categories.

1. Input
These are decoders for various formats. If you find a format Winamp doesn't support, you'll probably be able to find a plug-in for it.

2. Output:
These control how sound is output by Winamp.

3. Visualization:
There are almost too many of these, and they are for what plays on the screen while music is playing. To get a feel for what a visualisation is, turn on the visualisation that comes with the player ("Winamp Full," available for free from winamp.com), and then look at the reviews and download what you want from the "Visualizations" category on the plugins page (www.winamp.com /plugins).

4. DSP/Effect:
These change the way your music sounds. You'll need to experiment with the various plugins available—just click the "find plugins" button on the DSP/Effect page.

5. General Purpose:
Miscellaneous plugins.

6. Media Library:
Plugins for Winamp's inbuilt Media Library.

3.2 Windows Media Player

One of the most popular media players around, probably because it's bundled with Windows. Here's a look at its most important features as far as audio is concerned.

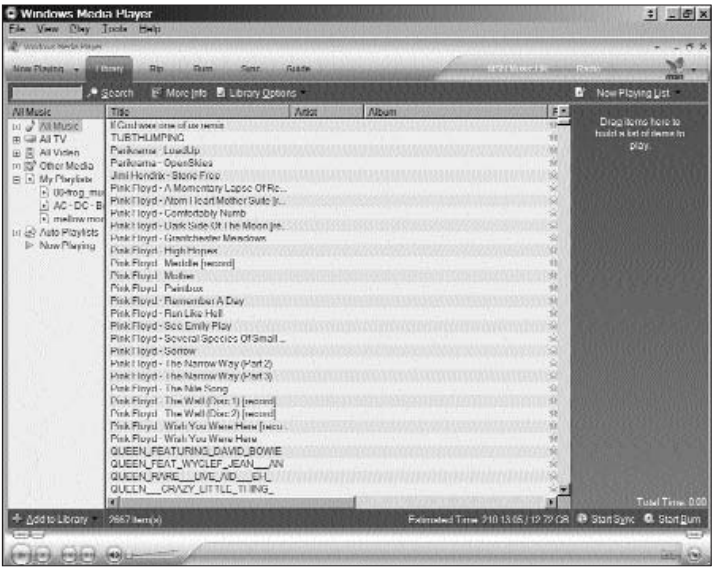
You'll see five tabs at the top of the player—Now Playing, Library, Rip, Burn, Sync, and Guide. When you click Now Playing, the window will display the video that's playing, or a visualisation if you're playing an audio track.

Notice the green button with a down arrow. Here, you can select visualisations, "enhancements," and plugins. Under Visualisations, you can choose from one of the inbuilt visualisa-

The Now Playing tab in Windows Media Player shows what's being played. You have your playlist at the right, and the other tabs at the top—very convenient

tions, or choose to download one. Under Plugins, you can choose to download plugins for WMP, just like in Winamp—clicking on Download Plugins takes you to the Microsoft page where you can download them. We encourage you to click the button and take a look at what's available. As an example, there are DSP plugins that can enhance your listening experience, such as DFX 6, which "enhances your listening experience with features such as ambience, stereo imaging, 3-D surround sound, dynamic gain boosting, hyperbass, and headphone optimisation designed to make audio at any bitrate on any computer sound best." This particular plugin is not free, but you can find free plugins as well.

Under Enhancements, when you click Show Enhancements, a new pane opens up at the bottom of the window. Here you get several options that add effects to the music or video being played. There's "SRS WOW Effects", which you'll need to experiment with to get a feel of. You can also specify the kind of speakers you're using so that the effect works best. Then there's "Crossfading and Auto Volume Leveling".



The Linrary tab in WMP shows the contents of your Media Library. The Media Library, as in other players, is a great way to keep your collection organised

Crossfading delivers a smooth transition between songs as the volume at the end of the first song fades out and gradually goes down, and the volume of the next song fades in and gradually goes up. (Crossfading is available only when you play WMA and MP3 files that are either in your library or on a data or HighMAT CD. It is not available with audio CDs.)

Often, when a new song begins playing, you need to adjust the volume because the new song is much quieter or louder than the previous song. The Auto Volume Levelling feature makes the Player automatically adjust the volume. The Player levels, or normalises, the volume by reading a volume-levelling value in a file, and then adjusting the volume accordingly during playback. Volume levelling is only available with files that are in Windows Media or MP3 format, and that contain a volume-levelling value. This value is automatically added to the files that are created when you rip music from CDs. You can also add this value to files on your computer that you have added to your Library. (More on

the Library later). To add a volume levelling value to files you add to your library, press F3 in WMP. The "Add to Library by Searching Computer" dialog box will be displayed. Click Advanced Options, and then select the "Add volume levelling values for all files (slow)" checkbox. The next time you add files to your library, any files that are in the Windows Media or MP3 format will have the volume levelling value added to them.

The next item in the Enhancements is the graphic equaliser. There are, of course, presets available. Then there's the Play Speed Settings: you can actually adjust the speed of the music playback! Finally, there's "Quiet Mode," which you might want at night—you can choose to have less of a difference between soft and loud sounds, so that there are no sudden eruptions of volume.

Coming back to the tabs at the top of the player, the next tab is the Library tab. You'll find a button called "Add to library" at the bottom left—clicking it will display a list of options by which you can add music (or video) to your Library. Once you've populated your Library, you're ready to take advantage of several features. Right-click on any item in the Library to see the options available. Just an example here: you can rate items in the Library. This is useful in a context we'll come to soon.

Look at the button between the Now Playing and Library tabs. When you click it, you get several options of what to play. You can select by Album, Artist, Genre, and from the playlists you created. You can also choose from an Auto Playlist—these include, for example, songs you rated high, high-bitrate songs, and many more, which is a very useful feature indeed.

And, of course, while you're at the Library tab, you can search for items in the search box.

The next tab is Rip: this, of course, is for ripping tracks from CD. You can obtain information about the album from the Internet via a button at the top right that says "Find Album Info".

Then there's the Burn tab, where you add items to burn to optical media, including DVD. Just click the Edit Playlist button at the top, and add the items you want.

The final tab we'll talk about is the Sync tab. Here, you can sync music with your portable device. Of course, the device must first be detected by Windows. Two panes appear under this tab—on the left is the files in your library that you want to sync, and on the right are the files on the device.

As an example of how to use the sync option, you can create a "Partnership." In a partnership, content can be synchronised automatically or manually between your Library and one device. WMP supports up to 16 synchronisation partnerships, which means you can synchronise content in your library to 16 different devices that you connect to your computer.

When you connect your device to your computer for the first time, WMP starts the Device Setup Wizard, which helps you create a partnership between the Player and your device. When you establish the partnership, you must specify whether content in your library will be synchronised to your device automatically or manually. When you connect your device to your computer after automatic synchronisation has been established, the Player and the device begin synchronising the content you selected, until all the items are synchronised. If you specified manual synchronization, then every time you connect your device to your computer, synchronisation will not start until you select the content and specify the order in which it is synchronised.

If you connect a device that already has a partnership to a different user's library, the Device Setup Wizard offers to use the device with the new library for the current session, or switch the device's partnership to the new library permanently.

What we've talked about should give you an idea of how powerful WMP is, and how useful it is for managing large music col-

lections. There are many more features, of course, and as always, we encourage you to explore all the menus!

3.3 Real Player

Another very popular media player, Real Player has an interface that is similar to that of Windows Media Player, except, obviously, for the colours. As in Windows Media Player, there are tabs at the top for the common functions—Now Playing, Real Guide, Music & My Library, Burn/Transfer, and Search. The interface is slightly more intuitive than that of Windows Media Player, and the features list is very similar.

The Music & My Library tab shows you your music collection, and here's where you add files to your library. The options here are similar to those in Windows Media Player—after you've added files

The video window in RealPlayer. The interface, in general, is similar to that of Windows Media Player

to your Library, you can browse by artist and genre. You can rate your music tracks, then build playlists based on such parameters as your rating, the bitrate, and more.

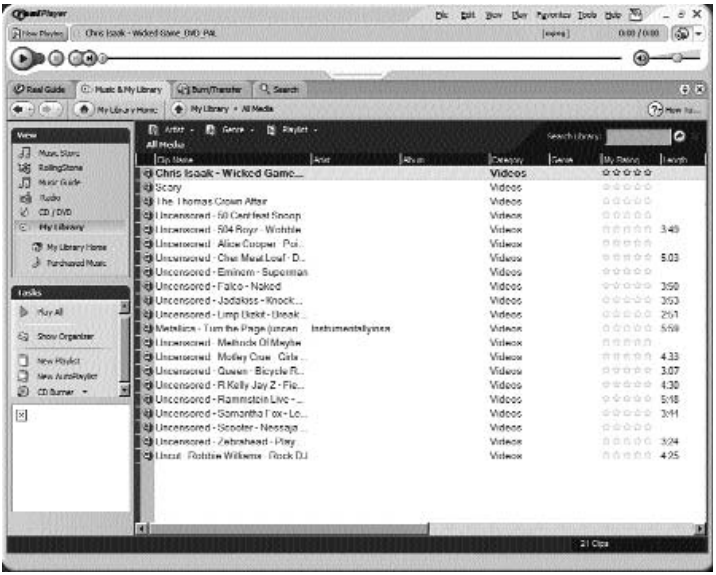
The "Radio" button on the left brings up Real's Internet radio station directory. Clicking on "CD/DVD" allows you to burn a CD after adding tracks to be burnt in the main pane. While here, the Tasks pane opens up, allowing you to print a jewel case and more. There's no DVD burning option, though.

The menu options at the top are straightforward enough. For example, the Favorites list shows you the bookmarks you've created—for Web pages, audio, radio and video.

Synchronisation works pretty much the same way as in Windows Media Player. Synchronization compares the content of My Library and the active (attached and selected) portable device. If the active portable device is missing any files, RealPlayer will download the necessary copies to the device. Synchronisation can be performed manually or automatically: to synchronise a device manually, select Synchronize Device from the sidebar in the Burn/Transfer page. To allow RealPlayer to automatically synchronise files, first select Change Options... from the sidebar to open the Options dialog. Next, select the Synchronization tab, and then select "Enable automatic synchronization..." Thereafter, whenever a portable device is attached to your computer and RealPlayer is running, RealPlayer will synchronise My Library with the device.

Help happens to be both online and offline: some items in the Help window will only show up if you're online.

RealPlayer, like Winamp, is skinnable—there is a default set of skins available, and you can download additional skins. Similarly, there is a default set of visualisations, and you can download more.



The Music & My Library tab in RealPlayer. By placing tabs such as Music Store on the left, RealPlayer incessantly urges you to visit their sites—and shell out!

Under the Real Guide tab, you have sub-tabs called Video, Radio, and Games. Under Video, you get movie trailers and such, under categories such as Most Watched and under various genres such as Comedy and Thrillers. You can play the trailers for free, but there's also a link called "Play Full Video"—this is a 350 Kbps streaming clip—but to watch this, you need to be a paid member of SuperPass. We don't know what you'll get to watch here because we didn't sign up, but in any case, since it's highly unlikely that you have a 350 Kbps connection, it doesn't matter!

The Radio tab gives you lots of free radio stations. Listed are the station name, a brief description, genre, bitrate (so you can choose one that your Internet connection can support), country from where it's being broadcast, and language. And you can search by genre, language and country. The few stations we tried played wonderfully, so we suspect only stations that stream well get included in the Real Guide.

Under Games, you get various games to download and try—you get a short description of the game, a free download link, and a full version download link (for SuperPass members only, again).

The address bar at the top isn't just for download links and radio station addresses—it's for any address, so RealPlayer can act as your browser as well!

Under the Search tab, you have two tabs: "Web" and "Audio/ Video". "Web" is basically Yahoo! Search. Under "Audio/ Video," you can find and play thousands of free audio and video clips, and what's currently playing in Real.

Each search result is displayed as follows:
- An icon that shows whether it's video or audio
- The title of the search result
- The time in hours, minutes and seconds
- The category the clip falls under—such as "Television," "Other," "Radio," "News," "Finance," and so on
- The bitrate of the clip (don't be too ambitious—but there are several 28.8 and 56 kbps clips as well!)
- A description of the clip
- The URL of the clip

You're also invited to "Visit RealOne Radio to tune into your favorite stations," which takes you back to the Radio page we talked about earlier.

The link to the right of Help at the top of the RealPlayer window—the "envelope with wings" one—is the Real Message Center. From the Help, "Message Center is a software application that alerts you to content clips specific to your interests." So how does Message Center work? You sign up for topics. Message Center will then occasionally check with RealNetworks' Message Service for new messages and downloads them. Message Center notifies you at which point, you can open it to view these messages. Within each message is a link you can click on to initiate play back of the associated story.

Basically, RealNetworks editors "search the content they work with and package the most interesting clips into messages for RealPlayer users." It's free.

Well, that sounded a little bit like spam and a little bit interesting at the same time, so we clicked on it. We got an option to "Customize messages" and also one to download them. "Customize messages" brought up "Coming soon"—so there seems to be no way to customise your messages as of now. When we downloaded the messages, we saw eight messages with eclectic content—some of them links to trailers, a couple of them called "Best clips of the month"—you get the idea. In all the messages is a link to Rhapsody, another service of RealNetworks. (Rhapsody, by the way, is something you need to download; it includes a music organiser, and it seems to be a paid service, because you can play 25 full-length songs a month for free, while you have a choice of 1.5 million songs. Visit www.real.com for more.) The messages weren't personalised in any way, and we suspect there' something here about what you specify when you download or install RealPlayer. We advise you to customise your preferences at your Real.com account, such as "demographic data." One way to get to your account is to click on the SuperPass ad and then under "More Info", click on "My account." Use the e-mail address and password you used when you downloaded or installed RealPlayer.

A word about SuperPass: if you sign up, you'll get the full-featured RealPlayer Plus, and you can

- Watch full-length movies and videos
- Download full-version games
- Access a comprehensive radio guide to 5,000+ stations

Though the service is $6.95 (Rs 325) per month, you can try it free for 14 days.

The "Globe" icon at the extreme top right of the RealPlayer window has a drop-down. The following are the items in the drop-down:

- RealGuide, which takes you to the same RealGuide page we talked about earlier.
- Music Store, which doesn't seem to be accessible at the time of writing
- Music Guide, which looked to us the same as the Video tab we talked about earlier
- Rolling Stone, which takes you to www.rollingstone.com, an entertainment site
- Radio, the same as the Radio tab we talked about
- My Library
- CD/DVD, to burn or play a CD or to play a DVD
- Burn/Transfer, for burning CDs and syncing with your portable device
- Search, which opens the Search tab we mentioned
- Web, which opens up the Web browser

With its integration of all things music-related, RealPlayer is a comprehensive package. You really don't need to leave the player if everything you're doing at your computer is entertainment-related. But there are three gripes we have. The first one isn't Real's fault: we need broadband to enjoy all the free content out there! Second, there's no DVD burning, as opposed to Windows Media Player. And third, when it comes to just playing your stored music, you have greater control over the way your music sounds with Winamp: even the equaliser and crossfade are paid in RealPlayer!

Get Your Music

Yes, we know most of you get your music from CDs burnt on your friends' computers, or directly from their hard disks! This is *illegal*! According to several sources, a CD is to be treated "like a book"—only one person should have it at any time. So sharing CDs is not illegal, but recording them to your hard disks as MP3s and then copying them from PC to PC is.

If you want to go legal, there are sources on the Internet for MP3 music. There are many MP3 sites that offer classical music (because so much of it is non-copyrighted), and at the other end of the spectrum, there's lots of music from bands you may not have heard of (because the artists want to promote their work). Here are some online music sources.

4.1 Legal MP3 Downloads

http://music.download.com/
Download.com—the music section, that is—claims it's the "premier source for free music," and also claims more than 75,000 MP3s. Of course, there's a search bar on top, and you can search by artist or song.

www.emusic.com
You get 25 free MP3s, but you need to register for this. Songs are as little as 25 cents (Rs 11) after the free trial. The plans go like this:

eMusic Basic: 40 downloads per month; Free 14-day trial, then $9.99 per month

eMusic Plus: 65 downloads per month; Free 14-day trial, then $14.99 per month

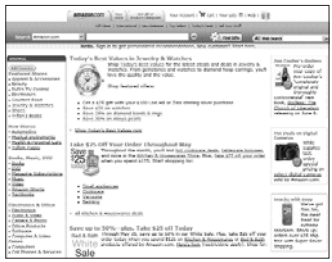
eMusic Premium Best Value: 90 downloads per month; Free 14-day trial, then $19.99 per month

www.ecbrown.org/linkpage.htm
A vast page of links to free MP3s—an eclectic-looking site; there doesn't seem to be much structure here—but you can poke around and find a lot of MP3s!

www.oddiooverplay.com
"This website exists to spread some happiness all over the planet by connecting you with fantastic artists who deserve to be heard," they say. The site is well-organised—a rarity amongst all these free MP3 sites—and on the left, you'll find Internet radio as well. The MP3s aren't on the front page for you to look at and download

though—a click here, then one there, and so on, until you stumble upon downloadable MP3 links!

www.elkysearch.com



This site happens to feature a podcast. In the main search window, the "random" button doesn't seem to work. We typed in "Metallica" and got a "suggestion": "stealthsonic..." and upon clicking that, we got to three working MP3 links. You can help by reporting broken links wherever they exist, via a link right next to each download link. The collection here seems to be broad but small.

www.amazon.com

Yes, beloved amazon.com does have a free MP3 downloads section! In the search box at the top left, just choose "Music downloads" and your keywords. Of course, chances are you won't find what you're looking for, because only non-copyrighted songs are free for download. But if you're a classical listener, you'll find some music here, and also if you want to listen to new artists in various genres. ("Metal" produced 12 results.) Well, just milk the site for whatever you can get for free!

www.mp3.com

At MP3.com, you can stream a lot of songs without hassles. You also get bleats for money, but you can listen to previews before you shell out. But even clicking on "free music" takes you to a place where, well, you can only stream music—but here, it's entire albums you can stream. There seem to be no free downloadable MP3s here.

www.mp3.com.au

Now this one is better-designed than mp3.com, with the search, genres, browse, etc. links rather neatly arranged. Explore and find your way around, and presto—downloadable MP3s!

www.archive.org/audio/etreelisting-browse.php
A huge archive. Click on an artist... click on a year... go to the download link... and you're presented with something called a "batting average," under a heading called "Download Show." Beneath that is a "Help with downloads" link—you'd do well to click that one. Clicking on "individual songs" takes you to a list of downloadable songs in .shn format, which seems to be an uncompressed format we hadn't come across thus far. You'll have to convert the .shn to mp3 or any other format yourself, using any of a variety of freeware tools such as MP3 CD Converter from www.mp3-cd-converter.com. Note that this is not a recommendation, just a pointer. Search for .shn to .mp3 converters yourself—and you just might find freeware.

www.soundlift.com/browse/music.php
Refreshingly simple. Select a genre, select a track, and hit Download. You can also stream the music. The number of genres is limited though—prominent amongst them are blues, jazz, soul and swing.

www.remixwars.com
The genres here include Ambient, Electronica, Futurepop, Gothic, Industrial, Noise (yes), Synthpop, and other exotic ones we've never heard of before. Anyway, we went to Industrial, clicked on an album, and were taken to a download page, but it turns out you need to have a (free) account with them to download songs. Go ahead—if you like "Noise," register!

www.asianclassicalmp3.org/index.htm
"The music on these Web pages is all from recordings, most often cassettes, that are either out of print, only available in the country of origin, or both," the site declares. There are a few countries listed—such as Burma, Cambodia, and, yes, India. Four links under "India." Downloadable MP3 links!

www.goingware.com/tips/legal-downloads.html#websites
This is a site full of links. We can't guarantee the legal status of all the links mentioned here, but the page is worth a look and a subsequent dig-around.

www.blentwell.com
If genres such as "bail funk" and "ghetto tech" and lots more are your kind of music, don't miss blentwell.com. Freely downloadable MP3s.

www.classiccat.net
A vast collection for classical music lovers. If you select a composer and a work, you're taken to a page that lists pages you'd like to visit, for example, from where you can purchase the CD. There seem to be no direct download links; the ones that do exist redirect you to the page where the music can be downloaded. We tried one; it took us to a page that listed the performer's works. And found lots and lots of downloadable tracks in RM, WMA and MP3! There's no direct search-to-MP3 mapping, so consider this site as a starting point for a classical music download search.

www.classicalarchives.com
A near-nightmare of a front page - garish and intimidating. But this text is prominent: "The Classical Archives is the largest classical music site on the Web: 37,815 full length classical music files by 2,018 composers. If you are new to the Classical Archives ™—PLEASE READ THIS!" Read that you should. Subscribers can access 1,000 files per month (100 per day), including all protected files such as hi-fi MP3s and concerts. Registered free users may access five unrestricted files per day—excluding hi-fi MP3s and other restricted files. Registration is free; a subscription is $25 (Rs 1,200) per year. Good enough.

http://epitonic.com
Go to album page. Check for available MP3s from album. Download. Or add to playlist and stream. Plenty of external links to artists' pages.

http://freesologuitar.com
A very small site, worth a one-time visit for acoustic guitar fans. Just visit the site and grab all the MP3s. Straightforward download links.

www.bestmp3links.com/hindi-song.html

A collection of links ostensibly to free MP3 download sites. We clicked on a few. Some worked, some didn't. Check out all the links and you might end up with some good Hindi MP3s.

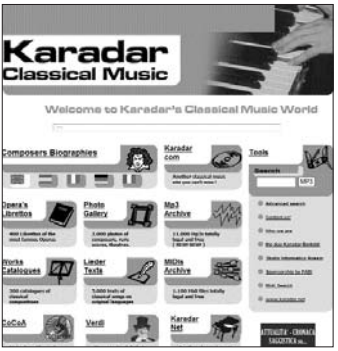
www.insound.com/mp3/mp3s.php

Rather a large collection—many tracks for free download. The site is well-organised, too. Individual tracks are downloadable—ostensibly as teasers—and albums can be bought.

www.isound.com

This site has tracks for download, radio, and blogs. Clicking on an artist's name and then on an album takes you to a link where you can buy the CD - bummer. But there is a free MP3s section as well. A decent-sized selection.

www.karadar.com



Karadar Classical Music seems too good to be true (as far as classical music listeners are concerned)—there seem to be thousands of tracks available for download! There's a hitch, though. You click on the download link, and pop comes up a window sans any clickability. A seeming dead-end. But we tried the same thing on Opera, and there was a visible clickable element—clicking that led us to a registration page. After registration, you can collect the music you want and put it in a sort of portfolio, and download the entire selection at once. Something really funny is that before you download your tracks, you're asked an easy classical-related question. If you get the answer wrong, you can't download! The "Purpose of the Question" is stated on the site—doesn't make any sense to us, though.

Oh, by the way, you need to click on the "MP3 Archive" link on the main page for "11,000 free MP3s." And be warned: downloads are very slow. If you're on dial-up you're fine; if you're on "broadband," prepare to be frustrated.

www.salon.com/ent/audiofile/index.html
"It's been offline a little while for maintenance, but the Audiofile archive of Thomas Bartlett's selection of the Web's best free downloads is back. You can browse alphabetically through hundreds of songs..." The site seems to get updated every once in a while with new additions. You can browse by artist. A somewhat limited collection.

www.smart-music.net/mp3.html
An average-sized collection of dance music by new artists. You can stream, buy albums, and download MP3s. There's also a radio station. They "offer some help for music-lovers... search the web for the finest and free dance music available."

http://onlinetonight.net/mp3
"Helping you legally download digital music that rocks: a service of Online Tonight and The Net Music Countdown with David Lawrence." The site is a music blog, and seems to be updated regularly. Lots of podcasts available for download as MP3s.

www.eclassical.com
A fantastic site for classical lovers—great music at great prices. Single tracks as well as albums available. Entire albums are available for as low as $6 (Rs 280)—and single tracks for as low as $0.79 (Rs 37). A large selection to choose from.

4.2 Legal Torrents

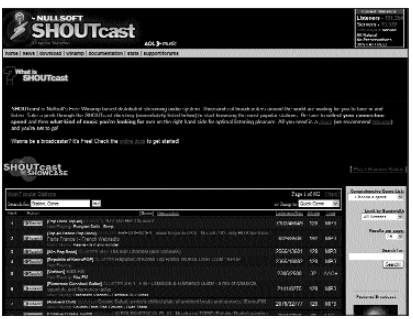
BitTorrent isn't illegal by itself—it depends on what you download. There happen to be a few (but only a few) legal torrents around. Browse through www.legaltorrents.com/index.htm and http://bt.etree.org/ to find some.

4.3 Internet Radio

We mention here only a couple of the large Internet radio portals, and a couple that have comprehensive sets of links. Some portals give you links to the radio pages, and some have "inbuilt" player windows. In many cases, you'll need to have RealPlayer installed.

Remember that (as for any Internet radio station) you'll need a "broadband" connection for the good sound! If you don't, there still is hope—you can find low-bitrate streams, too. A day of exploring the Web and you're bound to come up with a bunch of stations that can keep you musically entertained 24x7 on a dial-up connection as well.

www.shoutcast.com



Almost all popular genres. Free. You can also set up a radio server if you want—but we doubt you have the bandwidth! You can browse stations by genre, search for stations or genres, or browse through the near-650 pages of stations! You can also search by genre and bitrate (a cool feature). Just tune in, and Winamp will open (by default). Remember that (as for any Internet radio station) you'll need a "broadband" connection for the good sound! If you don't, there

still is hope—you can find low-bitrate streams, too. A day of exploring the Web and you're bound to come up with a bunch of stations that can keep you musically entertained 24x7 on a dial-up connection.

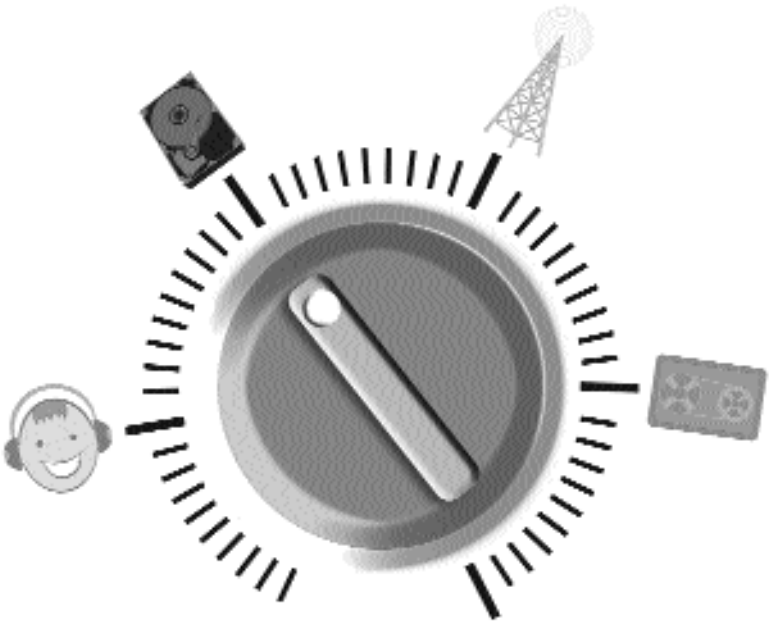
www.radiofreeworld.com/page14.html
This is a directory. There's everything from "Refreshing, soothing music at your computer 24 hours a day" to "Electrohumantransmissions" and "Radio guide for Florida Keys and South Miami." Take your pick. Here we tuned in to www.relaxradio.com, which is worth a mention.

www.live365.com/index.live
The big daddy of Internet radio portals. Lots and lots of genres and stations.

www.radiotower.com
Seems to have a large collection of stations. Looks like you need to subscribe, though—and you're going to get more spam if you do, no matter what they tell you. But here's where we found xlnc1.org, which is worth a mention.

www.radio-locator.com
Claims to be "the most comprehensive radio station search engine on the Internet." They "have links to over 10,000 radio station Web pages and over 2,500 audio streams from radio stations in the U.S. and around the world."

As a note, we should mention that you can record any audio stream courtesy a number of software players. One such is Zinf audio player, which lets you record to MP3. To download it for Linux or Windows, visit http://zinf.org.



Section II

Make

The Basics of Editing

Now that you've learnt how to get yourself ready for music, you will find yourself getting more involved in a little advanced stuff. Except for the musicians amongst us, not many of us can *make* our own music, but we sure can edit and change our collections to suit our needs! Let's start with the basics of editing.

5.1 The Rig And The Software

Before we start, a little diversion to explain what software and hardware you need.

If it's basic audio editing you want to try your hand at, you'd be relieved to know that the software is much less demanding than you might imagine. You could start off with as little as a Pentium III with 128 MB of RAM!

Ultimately, it's what you're going to do with your PC that's going to decide what it's going to contain. The first essential is hard drive space. Audio editing software likes to work with uncompressed audio, so a three-minute MP3 that would otherwise occupy around 3 MB of space will now be decompressed to about 30 MB in your temporary folder. If you're going to load multiple files (and you will when you're mixing audio files), you could find your hard drive filling up faster than Bill Gates' piggybank, so make sure you have plenty of free hard drive space for your software to use for temporary storing of uncompressed audio. Ideally, you should use a separate hard disk for this altogether (the audio editing program will let you choose a temporary folder), and preferably a fast one.

The next order of business is the processor. Applying effects to audio files will take considerable number-crunching power, but even a good old PIII can survive it if you're not going to be applying them real-time—that is, if you're prepared to select an effect, wait while it gets applied, and then undo if you don't like it. However, if you plan to mix karaoke numbers and process sound while it plays, you're going to require at least a Pentium 4 at 1 GHz. You'll also need a respectable amount of RAM—at least 512 MB for real-time processing.

Our recommended configuration:
- Windows XP
- 1.4 GHz Pentium 4 or equivalent Athlon processor

- 512 MB RAM
- At least 3 GB free HDD space
  (after you've installed the audio editor)
- Display card capable of a resolution of 1024 x 768 @ 32-bit colour
  (for those expansive consoles that software today sport)

Now that we've got the rig set up, it's time to kit it out with some of the meanest audio editors on the market.

Among the freebies, the only two worth mentioning are Audacity and WaveLab. We introduce Audacity in §5.5.

WaveLab

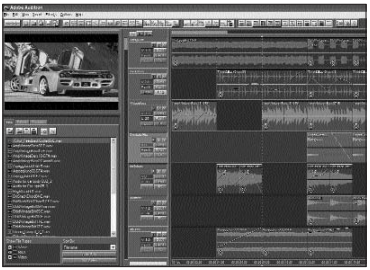
WaveLab by Steinberg Audio is actually a full-fledged paid tool, but you can download a stripped-down free version too. Another winning tool, it has a robust and intuitive interface, making it very beginner-friendly. This, too, supports third-party VST plugins, so you'll never tire of all the effects you can have in a single package.


Steinberg's WaveLab

WaveLab has been touted as one of the quickest batch processors on the market, applying effects and filters to multiple files in a flash. It even lets you author your own audio, data, or hybrid CDs from within the program itself, including designing CD covers and graphics. The Audio Database, a much ignored feature in the software, lets you organise your sounds and music into categories—something that will be a lot of help if you have a huge collection of sound bites and loops that you'll use often.

Adobe Audition

A good while back, there was a program called Cool Edit Pro that did some wonderful things for the way people looked at sound editing. No more was it the domain of the sound engineer—even


Adobe Audition

your average PC user could remaster audio in a snap. With its extremely easy-to-use interface and gaggle of effects—both fun and for serious audio cleaning—Cool Edit Pro swiftly gained ground as one of the most popular audio editors of all time. Not only was it an editor for individual files, you could also use the multi-track editor to create your own audio mixes with ease and immense control.

And then a company called Adobe Systems bought Syntrillium—the company that developed Cool Edit Pro—and rechristened Cool Edit Pro Adobe Audition. Since then, Adobe has been taking Cool Edit Pro to new heights, keeping it at its glorious Top-5 position. Support has been added for third-party VST and DirectX plugins. Adobe also somehow managed to bloat the installer from a very humble 20 MB to a gob-smacking 470 MB. It's also a bit heavier on system resources than the original.

If you love the features (and you can't help but), you could download the old Cool Edit Pro as well by searching for it on www.softpedia.com.

Sound Forge


Sound Forge and CD Architect

Sonic Foundry's Sound Forge (now Sony's) is another contender for top spot for audio editing. It, too, sports an easy-to-use interface, though it's a bit daunting at first. It's one of the most robust tools we've seen—recovering from a crash is hardly an issue, because there are always crash recovery files that come to your rescue. It works brilliantly with sound cards and

now even supports burning of full CDs, thanks to the bundling of CD Architect.

Unlike Adobe Audition, though, Sound Forge doesn't come with a multi-track editor—it's purely for editing and re-mastering audio: a good thing, because it gives Sound Forge focus, and renders it an extremely powerful workhorse for sound editing.

5.2 Why Editing?

Now, you might be wondering, "Why would I want to edit anything?" You're probably pretty happy with your 2 GB collection of favourite songs, as well as that 1 GB you don't like but can't get yourself to delete! Well, as right as that may sound, it couldn't be more wrong!

Let's take the example of an average music collection. You have a folder where all your music is stored, and have playlists nice and organised in your favourite media player, but you can never get too far from your PC, or be away for too long, because all the songs have different volume levels! So even though you'd like to sit back, kick your feet up and just enjoy your music, every now and then you're forced to sit and stare at the computer, increasing or decreasing the volume and/or equaliser settings to try and make that song sound just as loud and full of bass as the last one that played!

Worse, when you record your music collection from tape or vinyl (see chapter 7 for more on recording audio)—more often than not, you'll find flaws like muted highs and overdone lows, and the worst of them all—noise that makes music sound like it's being played through a waterfall.

5.2.1 So What Do I Do?

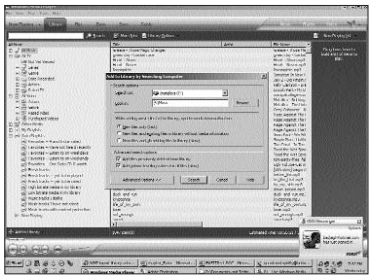
The short answer? Edit the music!

What you're doing when you change a music track or loop is editing. Rather than doing it every time you play the track using the

volume and equaliser settings, you can do it once and for all by editing the song.

The most basic type of editing is Normalising. In plain terms, normalising audio is the act of amplifying it so that the loudest point on the waveform is just under the maximum output level. Basically, it's just amplifying the waveform as much as possible without clipping (see §5.7 for more on clipping).

If you use Windows Media Player 10, you can try and get all your music to have the same volume level by choosing the right setting when adding the music to your library.



Use Windows Media Player to import all songs with automatic volume levelling

As you can see in the screenshot, just check the "Add volume leveling values for all files (slow)" and then import all your music. Though this will take considerable amount of time for any collection over 1 GB, you can (and should) just leave it while it imports. Here's one perfect example of how patience can pay off in the long run.

If you prefer some other media player, look for a similar volume levelling setting, which may also be called "Normalize."

However, if you want a more permanent change, and wish to be able to play all your music in *any* media player on *any* computer or even a portable device, and do not want spikes and dips in the volume levels, you can edit the songs using an audio editing software such as the open source Audacity, or Adobe Audition.

5.3 Decibels, Frequencies, What?

If you're going to try your hand at editing and splicing and mixing tracks, you need to have the basics right. For starters, you need to know some of the terminology and jargon you will find when editing. Since there are thousands of terms used in this field, we'll just stick to explaining the terms you'll come across when dealing with Audacity.

Amplify: When you change volume levels, you're amplifying the sound. In general sound terms, this could be the act of connecting a musical instrument to an amplifier that can increase the volume by a multitude of levels. In Audacity, amplification increases or decreases the amplitude of the waveform.

Bass: Sounds of lower frequencies are called bass sounds. The word is often mispronounced to sound like "bahs"; the correct pronunciation is "base."

Bass Boost: The Bass Boost effect raises the lower frequencies in a song to add more *thump* to the song.

Compressor: This is an effect you will come across in Audacity. What it does is soften the louder peaks of a song while keeping the softer peaks the same (as seen in the waveform, that is). Thus you get very little variation of loudness in a song. Try it on a song you know well and see the difference. Most often it will ruin a song, and should only be used on parts of a song where a particular instrument is accidentally getting drowned out.

Crackle: In audio, crackle is a sort of noise or distortion heard in tracks—much like the interference that a lot of us have become used to while using our cell phones. It can be best described as the sound that's first emitted from two-way radios (walkie-talkies) when the transmit button is pressed. Obviously, these are much-unwanted noises in audio, and filters need to be used to remove them.

Decay: When a sound grows noticeably softer with time, and finally dies out, it is said to be decaying. This is mostly used in an effect called Echo, where a sound needs to grow softer after every echo.

Decibel: Written as dB, this is a logarithmic measure of the loudness of a sound or power of a signal. The human ear, for instance, hears the faintest whisper at around 1 dB and feels ear-splitting pain at around 130 dB—0 dB is eerie silence to most people (some people have been known to hear the faintest of sounds at -10 dB). For a sound to appear about twice as loud, and increase of about 6 dB is required. Since the dB is a relative measurement, a 3 dB increase in signal sounds like a 50 per cent increase in volume. Say a sound is playing at 3 dB and you increase this to 6 dB, it will sound 50 per cent louder than before, but it's actually double the power being used to produce that sound. Increasing it to 9 dB would make it sound twice as loud as the 3 dB sound, but it is now using four times as much power. It's a little complicated, and you should visit www.prorec.com/prorec /articles.nsf/articles/EA68A9018C905AFB862 5675400514576 to get a better understanding of how the decibel is calculated. Warning: mathematics involved!

Echo: This is an effect where a sound repeats itself after a set duration, much like the way your voice echoes in large, empty spaces. In Audacity, a sound is "Echoed" by repeating it after a specified delay and with a *decay* that causes the sound to become softer with each echo.

Equaliser: This is the control that makes specific frequencies louder or softer. For example, with the Windows Media Player equaliser, you can control frequencies ranging between 31 Hz and 16 KHz (the human ear's listening capabilities typically fall between 20 Hz and 20 kHz). Of course, it's not just these specific frequencies that are controlled; the equalizer creates a curve between the frequency controls and modifies all frequencies according to the curve. Equalisers are often needed to tweak the output of speakers in differently-spaced areas (open-air, indoors,

crowded room, etc.), but you can play around with the equaliser to make the music sound any way you want (in terms of highs, mids and lows, that is)!

The Windows Media Player Graphic Equaliser

Fade In / Fade Out: The effect that's normally at the beginning or end of a song. If a song starts softly and then grows louder until it reaches normal volume, the effect is called Fade In. If a song goes from normal volume and gradually grows softer until it is inaudible, it is said to be fading out. You can set your songs to Fade In or Out by using these options from the Effects menu.

Filter: Much like the dictionary meaning of the word Filter, in musical terms, this is a device, effect or plugin that removes something from the sound that's provided to it. Most commonly, a filter is used to cut out *hiss* and crackle in an audio track, but is also used to single out frequencies to apply effects to them.

Hiss: Another form of noise in audio, hiss is most common and audible when there is a break in a song, or when there's any period of silence or soft music. The sound is called hiss because at loud volumes, it ssssssoundss like there'sssss a sssssssnake in your sssssspeakersss.

Noise Reduction / Removal: This is like a filter for hissing and crackling, and attempts to remove such noises from an audio track. The most common use for Noise Reduction is to remove the hiss that occurs when there is silence in a song, or while an instrument, such as an electric guitar, is powered up but not being played.

Pitch: This is something determined by the human ear, unlike frequency, which is the measurement of vibrations per second. Think of pitch as "frequency as heard by the ear": women's voices are generally more "high-pitched" than men's. Frequency is a

more accurate measurement of sound, and the difference between, say, 440 Hz (the note A above the middle C in concert music) and 441 Hz is not noticeable by the human ear. Thus, though the pitch of two notes may appear to be the same, the frequencies may not be.

Tempo: The speed at which music is played. If you listen to a song carefully, you will find patterns in the beats, and this defines the tempo of the song. If you speed up the beats, the tempo increases. In Audacity you will come across ways to change the tempo of a song, by either increasing or decreasing the pitch, or by keeping pitch constant and increasing or decreasing the length of the song.

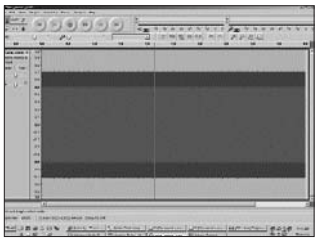
Track: Normally used as another word for song, but when editing audio, you can mix various songs by putting them in the same file, but in different "tracks." Here, tracks are merely a component of a final output. Musicians always record each instrument and vocal on different "tracks," so that each can be tweaked individually and then mixed to get that perfect balance of sound.

5.4 Waveforms

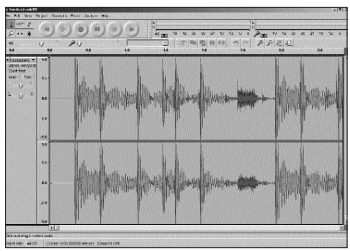
The next thing you need to know about when you want to do a little basic audio editing is how to read waveforms. This may look and sound complicated, but is actually a lot easier than it appears.

First of all, let's take a look at a typical waveform of a song and compare it to the waveform of a constant pitch—that is, a single note playing constantly with the same loudness.

As you can see, music has a lot of spikes and dips in waveform. Now, when editing this waveform, such as when cutting and splicing, you need to keep two things in mind—tempo and amplitude. It takes a trained musical ear to be able to tell the tempo of a song, but you can do this too. When zooming into the waveform, watch for patterns in it. Also, listen to the track as it moves through the


The waveform of a constant pitch

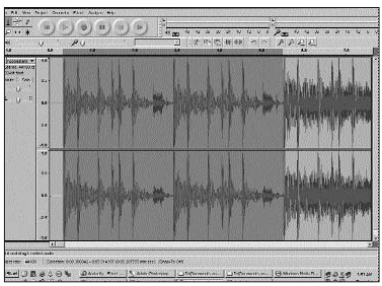
waveform and try and get two repetitions of a beat to fit into your display. To simplify, listen to the drums of the track. Listen for the beat sequence or the rhythm of the track. Once you have established a pattern, try and zoom in to easily fit two repetitions of that same beat sequence. This is how you can identify areas in the waveform to edit (cut / copy / paste).


A waveform of a typical rock ballad

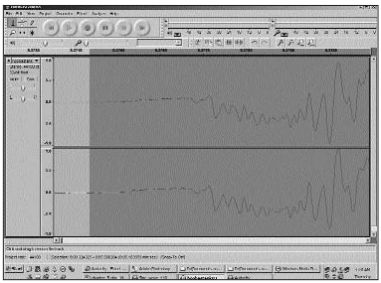
Let's look at the intro to a song: In this track, the intro is a simple drum beat, which repeats twice before the other instruments kick in. Though we loved the song, we wished the catchy drum beat would continue a little longer before the other instruments joined in. Though the artists didn't mean to make the song that way, we decided we'd just make it the way we wanted it, with help from Audacity.

First, as you can see in the screenshot, we zoomed in to the right level to get the rhythm right. We then proceeded to mark the area in the waveform that we wanted to repeat.

Here's where you have to make sure that you cut or copy a waveform selection from a point where the amplitude is 0—that is, a point where the wave meets the X axis. The reason for this is that at this point, for a very, very short time, there is no sound being emitted. Thus,

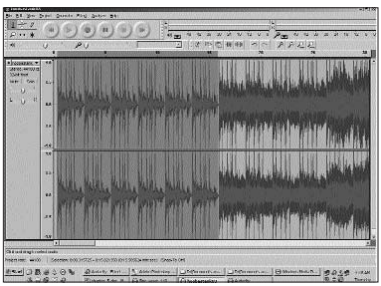

Copying part of a waveform from a song

cutting at this point would not cause a sudden silence or cause the pasting of this selection to make a noticeable pitch, tempo, loudness and musical change.


Cutting the wave at the right spot

Once you have marked the selection, you should play it using the spacebar. If need be, make a new file and copy and paste this selection into that about three times. This will make it easier to make sure that the track or selection actually loops!

In our example, we copied the selection to a new file and pasted it thrice. After checking to make sure that the selection was correct, by listening to it obviously, and that it looped nicely, we added it back to the original song. As you can see in the screenshot, the same song now has a drum beat intro that lasts three times longer than before.


The final track has a 300 per cent longer drum intro

These are the most basic and fundamental things you need to know before you start editing audio. We urge you to use some more effects and functions in Audacity, and remember to keep a backup of the song(s) you're opening for editing—just in case! Once you've mastered the tempo and waveform viewing, you're on your way to full-blown audio editing.

5.5 Audacity

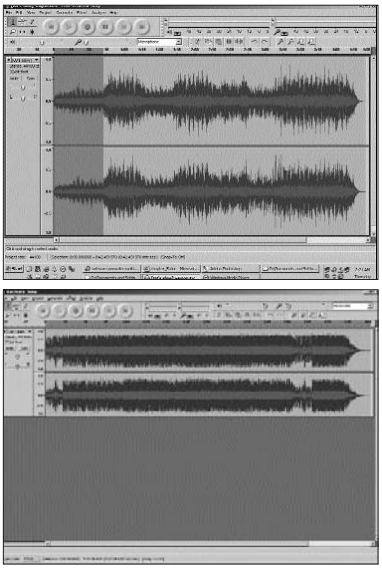
Called "the GIMP of audio" by its growing community of fanboys, Audacity is the free, open source underdog in the mean world of audio editors, which has been dominated by paid software vendors for a long time. It can edit most popular audio formats—MP3, OGG, WAV and MIDI among others, and it also has a multi-track interface that will let you mix tracks to create your own versions of songs. It's also very easy to use, and beginners will have no trouble getting used to it.

Audacity comes with all the essential effects loaded—amplification, time and pitch alterations, etc. (read more about these effects in chapter 8), and supports the VST plugin architecture (you can read about this, too, in chapter 8), which lets you keep adding more VST effects that you can download. The Virtual Studio Technology (VST) enabler is an interface that will allow you to connect your musical audio output devices, such as a synthesizer or effects, to Audacity for recording and editing. If you have a few musical instruments or software effects, you should download the VST enabler. If you're only looking for very basic editing, such as cutting, cropping and normalising tracks, there's no need. We do, however, encourage you to install it to give all the cool VST effects available a try—you might just discover a new hobby in audio editing!

There's no limit to the number or length of tracks you can load into Audacity, and it supports unlimited undos too—meaning that the only limiting factor here is how much free space you have on your hard drive. You can get Audacity from http://audacity.sourceforge.net/; it's just 2.3 MB. You will also need the LAME MP3 Encoder, which, too, you can find at the same site. This encoder will let you edit and export files as MP3, and since most of us have MP3 collections, Audacity is quite lame without LAME!

We proceed to explain how to use the normalisation and amplification features in Audacity.

5.6 How Normalisation Works



The before and after pictures of a normalised waveform

When normalising a wave, the audio editor treats the output range of your soundcard as percentages—0% means total silence, and 100% is the maximum possible sound output before clipping (§5.7) occurs. You could normalise your audio to any percentage within this range, meaning that no part of the sound will cross that level. So normalising to 80% will ensure that even at its loudest, the sound output will never exceed 80% of the maximum. Rather than offer you percentages, some audio editors will ask you to set a normalisation using decibels. The unit in play here is dBFS—decibels Full Scale. The maximum (yes, maximum) value that you should set this to is 0dBFS.

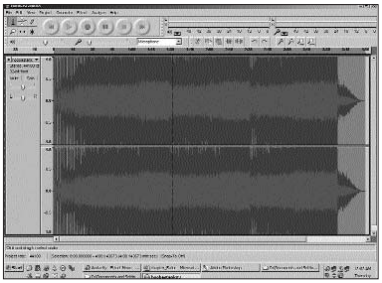
In most cases, normalising to 100% (or 0dB) will do the trick, but you also need to consider whether the files will be used later for any other audio editing work. If so, you should normalise to about 95% (or -0.5dB) which should give you enough room to play around with more effects.

Let's now get to normalising a track using Audacity.

5.6.1 Normalising Using Audacity

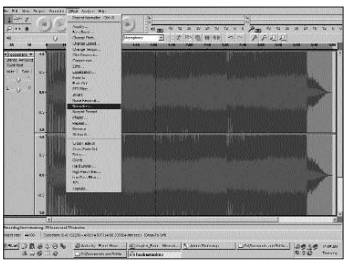
First open Audacity, then choose File > Open, and select the song you want to normalise. You should now see a waveform as in the

screenshot. Normalising a track in Audacity automatically sets the highest peak to -3 dB. This ensures that there's no jarring and distortion even at the loudest part of the song—the highest amplitude.



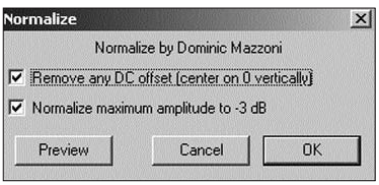
Opening a song in Audacity will show you its waveform

Click anywhere in the waveform and press [Ctrl] + [A] to select the whole song. Now go to Effects > Normalize..., and click Preview if you want to hear a few seconds of the normalised track, or just click OK to Normalize. You will see a smaller waveform, with lower peaks, and you will now not find distortion at higher volumes.



Select Normalize from the Effects menu to prevent distortion

The greatest advantage of the normalising effect is that it can be applied in batches (in the editors that support batch processing), so your music collection will have a consistent volume throughout. It's a standard feature in nearly any application that has anything to do with audio—you might have noticed the "Normalize All Tracks" option even when creating an audio CD using Nero.



Just click OK to normalise, or click Preview to hear a few seconds of the normalised track

Normalising music files as a group works in the same way as Normalise, only the peak of the wave is calculated by analysing the loudness of all the waveforms rather than fixing it to an arbitrary

value you selected. Or, you can make a list of songs that are noticeably louder or softer than the rest of your collection, and then use Audacity to make the songs softer or louder, as the case may be.

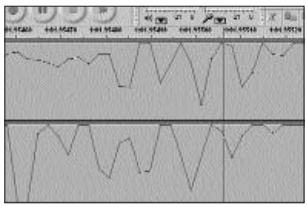

Here's the waveform for the normalised track

5.7 Amplifying And Clipping

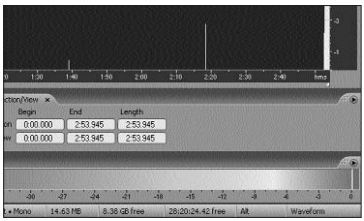
As we mentioned above, when a track is too loud or too soft in comparison to the others in your collection, you need to increase or decrease the volume whenever it is played. To avoid this, you can use Audacity's Amplify effect. Though amplification is generally synonymous with *increasing* the loudness of a song, in Audacity, you can use this effect even to make a song softer than it currently is.

Open a track, use [Ctrl] + [A] to select all then click on Effect > Amplify..., then move the sliders or fill in the value you desire. You have two values to look at here: Amplification (dB), and New Peak Amplitude (dB). Amplification is the amount in dB that you want to increase or decrease the sound by, while New Peak Amplitude determines how loud the loudest sound in the song will be. If a song is too loud, use negative values in the options to make it softer.

Another important thing to remember when using the Amplify effect is the *clipping* we've been talking about. The audio amplifiers in your soundcard and speaker system do have a maximum output limit, and once this limit is reached, your speakers will be driven at their maximum output until the sound level falls below the limit again. To you, the lis-


A waveform suffering the woes of clipping

tener, this means that you will hear a very undesirable distortion and crackling from your speakers, not to mention risking permanent damage to them.

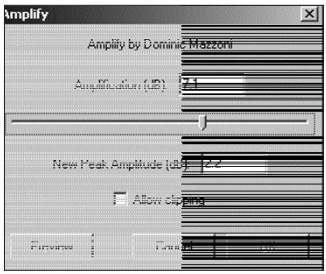


Audition warns you a little later

To see what this looks like in a waveform editor, pick any audio clip and give it an amplification of 10 dB or more. Now, in your waveform editor, zoom into the top of the wave and scroll through the wave. You will see at many places where the wave "flattens out" at the peak and stays that way for a while before coming back down. This is called Clipping—the waveform is "clipped" at the maximum capacity of your soundcard's amplifier.

Every audio editing tool will have at least one way to warn you before you end up with a clipped waveform. Audacity won't even let you apply amplification if it sees that the audio is going to be clipped (unless, of course, you explicitly tell it to allow clipping. A checkbox called Allow Clipping will let you amplify such that the loudest sound will be over the allowed threshold—which means it will probably distort at that point.). Audition, on the other hand, will show you red warning signs in the Levels frame at the bottom.

Of course, adjusting amplification is something you'll need to control yourself, so it's going to be quite inconvenient when you have a hundred or so audio files (and don't we all!) that need tweaking. For amplification that's a no-brainer and can safely be run in a batch, you need to normalise the audio.



You shall not clip! Audacity stops you from mistakes you might regret

Recording

A few of us play musical instruments, and it's obvious that we'd want to record our creations to our PCs in order to be able to mix and share them with friends. Apart from this, there are many instances where we have audio recorded on separate media or gadgets, and want to transfer it to our PCs. That's where recording comes in.

6.1 Getting Set To Record

There are a few things you need to have in order to be able to record sound to your hard drive. For starters, you need to have a sound card with microphone and line-in input jacks. If you're looking to record voice, you will need a microphone, or else, if you're looking to record from another audio source, you will need to have another player that can play back as a source for the audio.

Remember the days of the audio cassette? So many of us have such rare and cherished collections on audio cassettes, but don't have cassette decks (or players) anymore! Some of the albums we have aren't even available anymore, on CD or on the Net. So what can you do? Simple: just clean up your old cassette deck, connect its output to the line-in of the computer, and start recording!

We'll walk you through that a little later, but for now, you've already found one good reason to learn how to record to your computer.

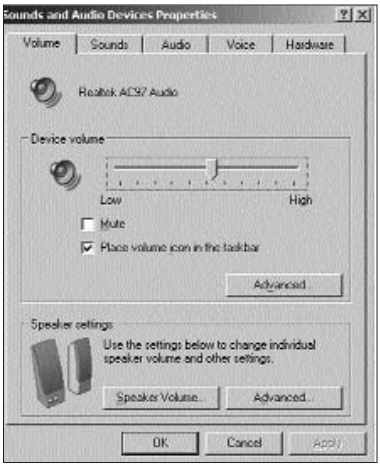
Another very good reason, especially for journalists, is when you interview someone and use a mini cassette voice recorder. Often, the volume of the recorded voice is too soft, and there's too much noise in the background. The simplest thing to do would be to record it to the PC and then use an editor such as Audacity to clean it up and make it louder.

Then of course there's the case of wanting to record your voice or musical instrument to the PC...

6.1.1 Setting Up

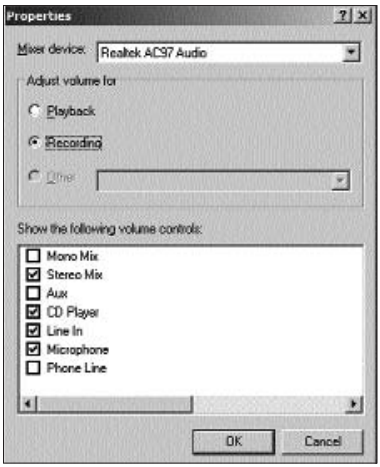
If you just bought yourself a sound card and are looking to record from any type of audio source, you need to first set up your computer for sound. If you haven't read through the previous chapter on how to set up the audio editing PC, you should do so now.

Once you have your sound card, microphone and speakers in place, you will need to set them up for recording. If you're using the microphone, there's nothing more you need to do in terms of setting up. If you want to record from a cassette player or from a musical instrument, however, you will need to connect the audio output of the source to the line-in of the PC.



Check the appropriate box to display the Volume Control icon in the Taskbar

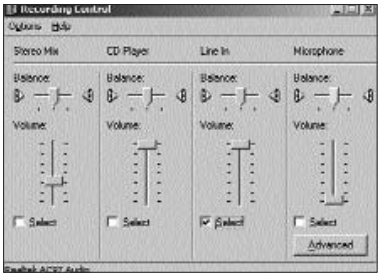
Next, see if you have the little speaker icon in the taskbar and double-click it. If not, you will have to go to Control Panel > Sound and Audio Devices, and then check "Place volume icon in the taskbar". Click Apply and then OK, and you will see the speaker icon. If the option is greyed out, you will need to make sure your sound card drivers are installed, and that there are no devices with yellow exclamation marks (meaning wrongly configured hardware) in the Device Manager.



You can choose what settings you want to see in the Recording Control box

Once you double-click on the speaker icon, you will see the volume controls pop up. Now, click on Options > Properties, and select the Recording radio button. Under the "Show the following volume controls" head-

ing, you will see various options for inputs; make sure Aux, Microphone and Line In are checked. Click OK, and you will see the options you selected displayed in the Recording Control dialog.



Check the box corresponding to the input you want to record from

If you're going to be using the Microphone to record your sound, check the Select box below Microphone. Repeat the same procedure for when you have to record using the line-in port on the sound card. Since you can only select one input at a time, you will have to repeat this procedure once you're finished using, say, the Microphone and now want to record using the line-in input.

6.1.2 Keep It Quiet

When recording using the microphone, you will have to make sure to cut down on ambient noise. Some microphones are extremely sensitive, and might even pick up the whirring of the CPU fan. You should even switch off ceiling fans, and make sure all windows and doors are closed.

If you can, block the gaps between the floor and the door(s) with cloth to keep ambient sound to a minimum. Also block off gaps in windows.

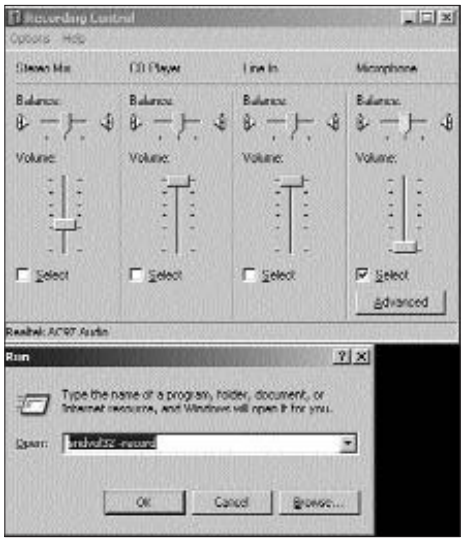
Next, you should be concerned about the placement of the microphone. In order to reduce or avoid any echo or reflected sounds, make sure that the immediate surroundings have irregular surfaces (basically anything but blank walls). A soft rug hanging on the wall, or a bookshelf, or even sticking the egg trays on the wall are good deterrents to echoes. The simple physics is that irregular surfaces do not reflect sound well, and thus prevent you from getting a dull-sounding recording. Also, try not to face a wall at a 90 degree angle—a 60 to 45 degree angle will send any

reflected sound off in a different direction rather than straight back at you.

The next thing to do is try and use headphones instead of speakers. This is because, with the default settings, anything you input into the PC is output through the speakers. So if you speak into a microphone, unless you specifically mute its output, your voice will be played back through your speakers. This can cause feedback or weird echoes, and you certainly want none of that!

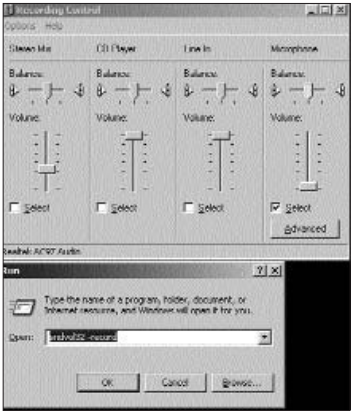
If you just have to use speakers, make sure you mute the microphone output. You can do this by double-clicking the speaker icon on the task bar and muting the microphone. Don't worry—this will not cause your microphone to stop picking up sound; it will just prevent the sounds picked up from being instantly played back through your speakers. If you have to hear what you're saying, for reassurance, pull down the microphone volume to an extent where you can just about hear its output from your speakers. Also, make sure your speakers are pointed away from the microphone.

Do a test record, for which you can use Microsoft's own Sound Recorder. Go to Start > Programs > Accessories > Entertainment > Sound Recorder. You will see the Sound Recorder window. Click on the big red record button to start recording. If you're going to be speaking into the microphone,



You can use the "sndvol32 -record" command to get directly to Recording Control

do so normally. Then play back the sound to make sure it isn't too loud or too soft. If it is either too loud or too soft, you will have to go to the Recording Control—Start > Run, type in "sndvol32 -record" and press [Enter]. Here, increase or decrease the volume of the microphone as required.

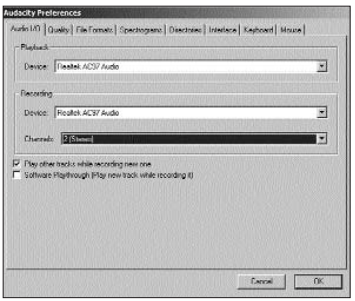


You can use the "sndvol32 -record" command to get directly to Recording Control

Once you've set a satisfactory volume, you should be able to hear your voice clearly without any distortion or jarring. This means that your microphone is set optimally. If you don't change any volume control settings, this should be a permanent tweak. You're now set to record using the microphone. In order to record from the line-in input on your card, you will have to do all the same tasks you did to set up your microphone (except for sound-proofing your room).

6.1.3 Recording Using Audacity

Start up Audacity, and the first thing you should do is head to Edit > Preferences, or press [Ctrl] + [P], and under the Audio I/O tab, make sure your sound card is selected as the source for both Playback and Recording. Also make sure that the number of channels is set to "2 (Stereo)", or else everything will record in mono!



First set Audacity to record in stereo from the Preferences

Now make sure you've connected the device you are recording from to the correct input jack (microphone or line-in), and also that the same is

Here's what you see the first time you try and save a file as an MP3

being used as the recording source in the Recording Control options (Start > Run > "sndvol32 -record" > [Enter]). Once you're set, do a test run to see what volume levels are acceptable for recording without any clipping. You will be able to tell by looking at the waveform that's being recorded: if it goes above or below the threshold, it's clipping! This will cause distortion during playback, so lower the input volume. If the input volume is already all the way down, and clipping is still occurring, try lowering the volume of the input itself from the Volume Control options.

If you want to record everything that is played through your sound card, go back to the Recording Control options and set the input source as Stereo Mix. Now, go back to Audacity and try recording again. If there is no clipping occurring, you're set to start recording.

Always start recording *before* you begin playing back the track from the source—it's a lot easier to delete blank spaces in waveforms than to start over and record from scratch because you missed the beginning of the song!

To start recording, just press the big red record button, which is the universal symbol for recording. Now, quickly start the source audio that you want to record and wait for the song to finish playing. Since the volume settings are saved for all recordings afterwards, it's a good idea to keep an eye out for clipping to prevent distorted playback!

Once you're done recording, you can choose to just save the file, or normalise it first. We suggest you normalise the file and then save it (see §5.5.1 for more on normalising). When you try and save the file as an MP3, you will get a dialog box from Audacity asking you to specify where the LAME encoder DLL file is saved.

Point it to the right location and then save the file as an MP3. You will also be asked to provide ID3 tag information for the MP3 you are creating. You should do so.

Just add the ID3v2 information and press OK to save as MP3

Of course, you can try and edit the files before saving them, and apply effects to them such as Bass Boost for songs with weak bass lines, but that's not common practice! Whether it's guitars, vocals, recording from streaming video or just simply converting your audio cassettes into the MP3 format, the procedure for recording and saving remains the same. Congratulations—you've now learnt how to go about digitising your collection!

Effects

There's plenty you can do to make your audio sound better—from simple volume boosts to some very weird effects. Here's the skinny on how you can clean up your audio or turn it into something entirely new. We'll be using both Adobe Audition (a 30-day trial of which you will find on the April 2006 *Digit* DVD), and Audacity (which you will find on this month's CD). If you haven't done so already, refer §5.5.1 and §5.6 for the basic effects—normalising and amplifying.

7.1 Noise Filters

The biggest inconvenience you are going to encounter in the world of digital audio is with recordings you made using a microphone, and recordings from old tapes and records. You can't help it—each of these files will have an annoying hiss in the background that can range from mildly disturbing to extremely annoying.

MAGIX Audio Cleaning Lab makes noise removal a snap

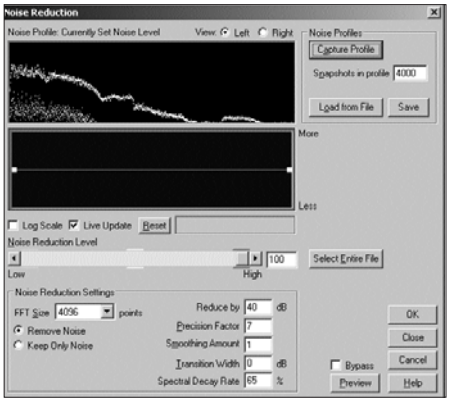
The problem here is Noise—electrical disturbances that inevitably get into your music through wires or poor contacts. Noise is prevalent across the entire frequency spectrum of your sound, so it's very difficult to remove. Thankfully, not only do all worthy audio editors come with their own noise removal tools, you also have dedicated audio cleaning software like MAGIX Audio Cleaning Lab to help you through these painful times.

7.1.1 How to use a Noise Filter

The first thing you need to do to remove noise from your audio is to build a *noise profile*. A noise profile indicates how strong the noise is at different frequencies throughout the audio clip. To build a noise profile, you need to select a portion of your audio that is supposed to be silent, but actually has a very audible hiss—the first couple of seconds before the music begins are ideal for this.

Once you've selected an area that provides a sample of the noise, fire up the noise remover—you'll find it in the

Effects menu of your program (Adobe Audition categorises it under Restoration). Choose the "Build Noise Profile" option from there.



Building a Noise Profile in Adobe Audition

Now that you've built a noise profile, the program knows what it should look out for. Select the entire waveform and apply the noise removal tool—your music should now be noise-free.

While Audacity does the basic job of noise removal quite admirably, you're going to need more advanced audio editors to salvage really bad audio. Adobe Audition has its own tools for removing Hisses, Clicks and Pops. Dedicated audio cleaners such as MAGIX Audio Cleaning Lab offer even more advanced methods like the Spectral Cleaner, which lets you edit out background sounds such as coughs and slamming doors.

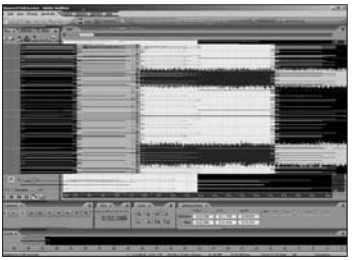
7.2 Just For Fun

Well, we've cleaned up bad audio, but what does one do with clean audio? Why, mess it up, of course! Whether you want your songs to sound like they're coming from under water or playing in a large stadium, it can all be easily arranged.

7.2.1 Time and Pitch effects

For an explanation of Tempo and Pitch, refer §5.2. There are three ways you can use these effects:

1. Time-Only: You can make the music run faster or slower, keeping the pitch intact. Unlike fast-forwarding a tape, where people's voices get squeakier the faster the tape moves, this will sound more like faster or slower singing.

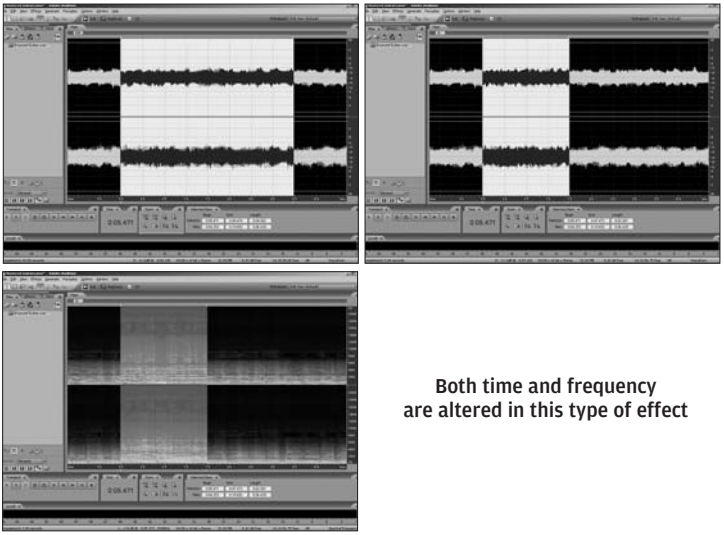


2. Pitch-Only: The converse of time-only effects, you can change the pitch of the music without changing the length of the track. For example, by increasing the pitch, you could make even James Earl Jones sound like a chipmunk!

Time-Only effects change only time—the frequency spectrum remains the same

3. Both: This is your standard my-audio-tape-is-running-too-fast effect. Not only will the audio

Pitch-Only effects change only frequencies—the time remains the same



Both time and frequency are altered in this type of effect

clip run faster, the sound will also come out a lot higher than it should.

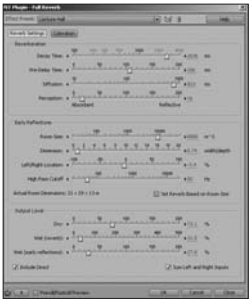
Adobe Audition throws in all time and pitch effects under Effects > Time/Pitch, while Audacity has them under Effects as Change Pitch, Change Speed (both time and pitch will be affected), and Change Tempo (only time will be affected).

7.2.2 Reverbs

Reverberation effects—or simply "reverbs"—can be used to simulate the natural effect of sound bouncing off surfaces and creating echoes. These echoes occur so quickly that the human ear barely make out the difference between the original sound and the echo. Still, the effect is strong enough to for us to be able to identify the environment, be it a tiled bathroom or a cramped closet.

So even if you've got the studio version of a song, you could use the reverb effect to give it a "concert hall" sound and brag to your friends about how you have a rare live version.

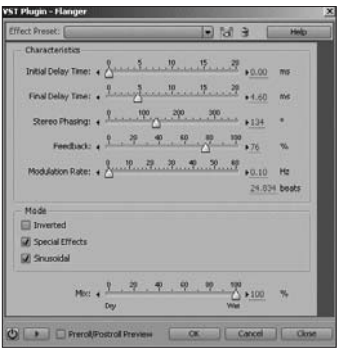
Your audio editor will give you a lot of flexibility when it comes to simulating these real-life effects—you can enter the size of the room, the damping (how much strength the sound loses when it bounces off a surface), and many other parameters. Audition's Full Reverb effect offers you enough options to make you dizzy, and the sound quality is quite impressive as well.



Adobe Audition's Full Reverb effect

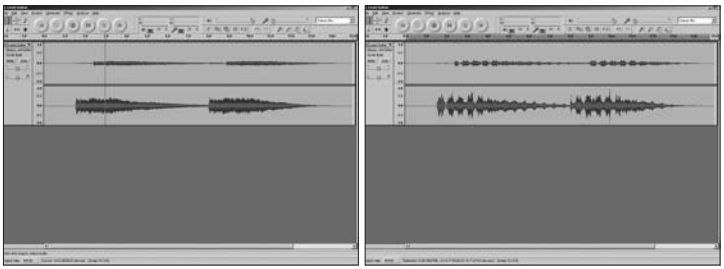
7.2.3 Flanges and Wahwahs

In audio lingo, flanging is mixing identical audio signals, albeit with one slightly delayed. The delay is usually not fixed, and varies over a small range. The resulting sound is a strange, psychedelic effect reminiscent of the weird, "trippy" music of the '60s and '70s. This is much like listening to music through a long drainpipe.



Audition's Flanger

The funny-sounding wahwah effect gets its name from the guitar special-effect pedal by the same name. The wahwah effect gives music a very expressive, pulsing feel—much like saying "wah" or the siren of an ambulance.



An innocent guitar riff... and then... Wahwah!

7.3 Getting More Effects

We don't live in the dark ages of audio editing any more—you don't need a million editing programs just so you can have the widest choices of effects. For a much wider choice of effects, you can extend nearly any audio editor thanks to a standard plugin architecture called VST—Virtual Studio Technology.

7.3.1 What are VST Plugins?

Virtual Studio Technology (VST) is a standard interface by which effects can be loaded into any audio editing program. The architecture was developed by German company Steinberg, and has found immense popularity. At a conservative estimate, at least 1,500 VST effects exist, most of them free of cost.

The purpose of the VST effect is to replace as much of the recording studio's hardware as possible to create a Virtual Studio. In the second version of the VST architecture, Steinberg introduced the ability to send MIDI data to the audio editing program, thus giving rise to the VST Instrument. As the name suggests, VST Instruments can simulate MIDI synthesizers to let you create your own music on-the-fly. Most VST effects work in real-time, so you'll need a considerably powerful processor to run them.

7.3.2 Where do I get them?

A simple Google search will take you to a gaggle of Web sites where you can get free VST plugins. Here are a few that caught our attention:

AudiOracle (www.audioracle.com/freetrials.php)
VST Instruments ranging from the extremely useful to the utterly pointless and fun. You will also find plenty of resources and articles on audio editing, as well as a forum where you can discuss audio with other members.

Tweakbench (www.tweakbench.com)
Tweakbench has a collection of weirdly-named VST Effects and Instruments. Choose from drum kits, tone generators and many more.

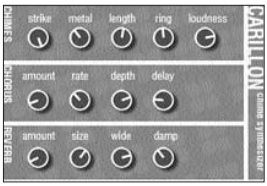
GERSIC.com (www.gersic.com/plugins/)
A massive database of plugins, effects and instruments, all neatly categorised and updated regularly.

7.3.3 How do I install them?

Installing a VST plugin is ridiculously easy—they're available as DLL files, which you just need to put in a standard folder. Point your audio editor to use this folder as the default location for VST plugins, and you're done! You might need to restart the audio editor or refresh its effect list every time you add a new effect.

7.3.4 Some cool VST Effects and Instruments

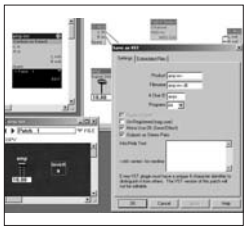
Carillon
Carillon is a bell and chime synthesizer, and even has a bunch of chorus and reverb effects. Ready to start creating your own version of ACDC's *Hell's Bells*?



Stringer
Fancy a string orchestra on your PC? Stringer comes chock-full of sound samples from string instruments which you can now use in your own creations.

Bojo Organ One
Organ One is a virtual 16-voice organ. Eerie gothic music is a snap with this one!

XOXOS Pack
A massive bundle of VST plugins—from the Synger voice synthesizer to the Murder distortion effect. There's plenty here to keep you occupied.



The Home DJ

Got turned down by the hot club down the street? Don't worry, you'll be showing them a thing or two about mixing music soon enough—here's how to transform your PC into your own music studio without even getting out of your pyjamas.

8.1 The Toolbox

We're assuming that you've read §5.1 and made sure that your PC is up to the task—especially if you're going to be mixing music in real-time. The next thing, of course, is software. To choose the right software, you'll first need to decide how you're going to produce your music. Would you rather mix tracks live for a party at home (karaoke night, perhaps?), or would you rather create your mix at your pace? We've looked at software in both categories, so take your pick!

To our considerable disappointment, we've discovered that though there are some good free tools, none of them really holds a candle to the paid, more advanced versions. No "free vs. paid" war here—paid wins each time.

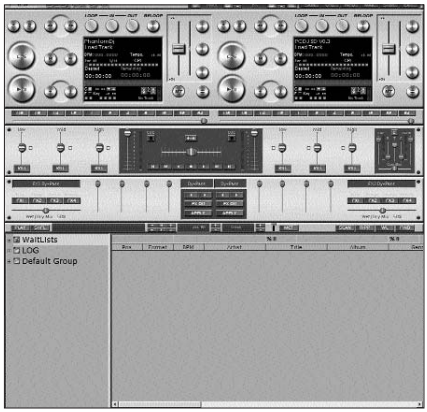
VirtualDJ—The Life of the Party

The darling of many professional DJs across the world, VirtualDJ is so easy to use you probably wouldn't believe that even the pros use it. It's got a typical two-turntable setup—load your files onto them and mix away! You can even scratch records back and forth for some cool intro and exit effects. And with its special "beatlock" engine, your tracks will emerge from a scratch still in sync. You will also have a number of sound bites and effects which you can work into your mix. For karaoke night, there's a special effect that lets you cut out vocals (though the accuracy of this feature can't always be guaranteed) so you can sing along without the real singer's voice bothering you. You can record your session as an

VirtualDJ—quite like the real DJ's set up

MP3 to show off to friends later, burn it on to your CD, and when you're ready, broadcast it over the internet for everyone to hear. You're going to need an enviable internet connection for that last feature, and so will your audience.

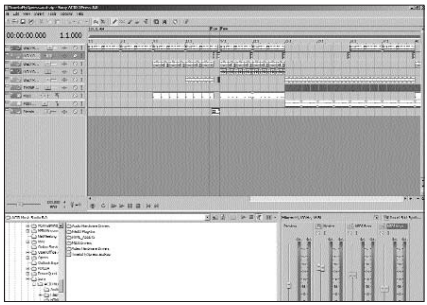
Visiosonic PCDJ FX



PCDJ—a little arcane, but still powerful

PCDJ has all the goodies you'll need in DJ mixing software—two decks, the ability to organise your music, apply effects and adjust tempo, just to name a few. The interface is a little weird to get around, but you'll settle in eventually. The feature set is almost identical to that of VirtualDJ, but how much PCDJ scores over it depends on how successful it's VRM (Virtual Rack Module) plugin system is going to be—its plugins are made to look just like the machinery that would be put on large audio racks (in real recording studios) to add effects.

ACID XPress 5.0—The teaser mixer

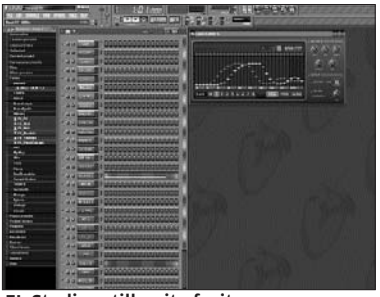

ACID Xpress—the big tease that nags you to go pro

ACID Music Studio and ACID Pro are both incredibly powerful tools to create your own music, remix existing music, add soundtracks to video, and a plethora of other music authoring features. They do cost a bomb, however, which is why we have ACID Xpress—a stripped down version of both,

which in itself is quite the powerful tool. It features an easy-to-use interface, where you can "paint" on the different tracks of your music, time-stretch it on the fly and create impeccable loops. It even has a bunch of how-to tutorials when it starts up to show you just what you can do with it. Sure, it does nag you to buy the paid versions for the cooler features, but this one still wins some kudos as is.

FL Studio 6.0

Formerly FruityLoops, it's no wonder that the word "Studio" had to be added to the name—FL Studio has always been a favourite with those interested in creating their own dance music tracks. While it started out primarily as a software to create music loops, it's now a full-blown music mixer, complete with effects processors and other bells and whistles. You'll be able to create some semblance of music within the first minute of your session—that's how easy it is to use. All you need to know is that unlike many editors today that let you place sound clips on a timeline, here you enable or disable them using on-off switches that determine when a sound is going to be played. Though still quite heavily geared towards the creation of new music rather than mixing existing sound, it's quite an amazing tool. It even supports the open VST architecture, so you can keep adding plugins whenever you want. And if all that weren't enough, Blake Reary's *Hanging On*, recorded exclusively for FL Studio in FL Studio is one of the most addictive tracks we've heard in a while.


FL Studio—still quite fruity

Cubase

Steinberg Audio's (the creators of the VST open architecture) flagship product, Cubase, had been much abused for its CPU-hogging capabilities, but Steinberg cleaned up their act and Cubase is now one of the fastest mixing programs out there, even on compara-

tively low-end PCs. The sound is impeccable and the mixer, too, is quite easy to use. The interface is quite similar to other audio sequencers, so users will have little or no trouble getting used to it. It also comes with a fairly powerful audio editor, so you don't need to switch programs for minor adjustments to audio.

8.2 Recipe For A Remix

With so many remixes on our TV and radio channels today, you're probably wondering if you could do a better job at it than some of the artists seem to. Well, go ahead and try!

The Ingredients

1. Audio Track (1)

Obviously the most essential. You can use anything from your own private music collection, but if you plan to inflict this remix on the rest of the population, you will need to find yourself a royalty-free track lest you get persecuted for copyright infringement. If you can, get your hands on an *a cappella* track—one with no musical instruments, just voice. Or you could just record your own. This way, you won't have to bother about cutting out any background music—just start mixing immediately.

2. Audio Editor (1)

You're going to need this for a lot of things, including cleaning up your main track and the other sound clips you're going to use. Our recommendation is Adobe Audition (or its former self, Cool Edit Pro), though Audacity should also work well.

3. Audio Mixer (1)

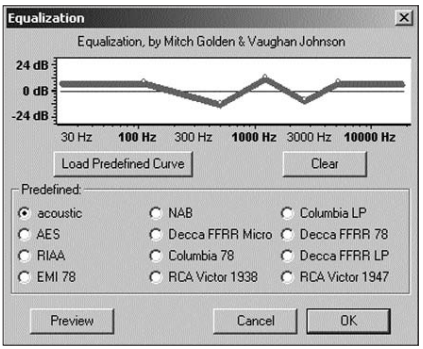
If you're going to use Adobe Audition as your audio editor, you can stick with it and use its own impressive multi-track editor. Audacity, too, is quite capable of mixing music, though this can be a bit tiresome. If you don't wish to spend any money at all, Audacity and ACID Xpress is the combination for you. You might also want to choose a mixer that lets you create music to be inserted into the mix.

4. Audio Clips and Loops (To Taste)
Find yourself a few good loops which you can use as the background for your remix—we've thrown in a list later in this chapter. And what's a good remix without some weird sound effects and random voices? Get some of those, too.

5. Time (Plenty, To Taste)
Remixing audio is a task that requires the patience of a hermit—you're not going to get the results you want in a jiffy, so if you expect to churn out a winner in five minutes, you're going to be sorely disappointed.

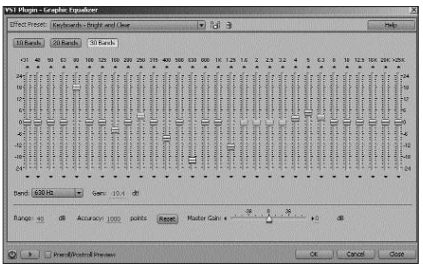
The Procedure

1. Prepare the track
If you've decided to pick a track from your own collection, your first task is to isolate as much of the voice as possible. To do this, you will need your audio editor's graphic equaliser. You will usually find voice between the 300 Hz and 3 kHz frequencies—use the equaliser to cut out all but this frequency range. Of course, this is going to change from artist to artist, so you will need to experiment with different frequency ranges.



Audacity's Equaliser—useful, and yet a little useless

We tried this in Audacity, and its slightly eccentric equaliser, coupled with its lack of a real-time preview, made things rather annoying. Audition,


Audition's Equaliser—full, functional and fun

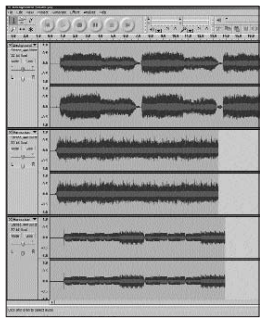
on the other hand, has the option of using a 30-band graphic equaliser and a real-time preview, so isolating the vocals took a lot less time. If you've managed to lay your hands on an a cappella track or have recorded your own voice, make sure you've cleaned up the track using the techniques we mentioned in Chapter 5.

2. Cut up the track

For a better remix, it would be wise to cut up the voice track into smaller "sound bites" rather than keep it as an entire track. This way it'll be more manageable, especially if you want to create a remix that's much longer than the original. Any audio editor should be able to do this without flinching.

3. Set the pace

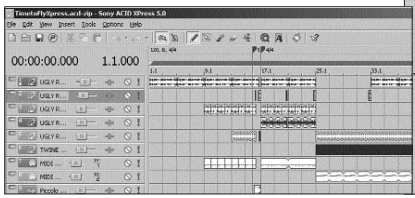
You're probably going to speed up or slow down the track you're remixing, so use your audio editor to change the pace. In mixers such as ACID Xpress, you can speed up or slow down the entire mix, which is going to help you synchronise the voice and drum loops better.



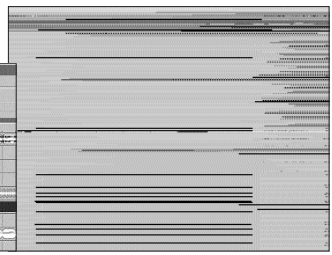
Mixing in Audacity

4. Start Mixing!

Now that you've finished with the preliminaries, you can start adding sound clips to your multi-track audio mixer. Most of them will let you just drag and drop music clips onto different tracks. You can manipulate the sound in each track independently, and the final result will be an addition, or a *mix* of everything in the mixer. You will



Mixing in ACID Xpress



Mixing in Audition

also be able to set the volume for each sound clip. A drum loop in the background, a few screeches and squeals generously spread out, and your remix is done!

5. Render your mix
Once you've finished concocting your mix, you can export it to nearly any popular audio format—MP3, OGG, WMA, and so on.

6. Take your talents online!
Getting pretty good, eh? Curious to know how you match up against other wannabes across the planet? The ACID Web site, www.acidplanet.com, regularly holds remix contests featuring even big artists such as Madonna and Depeche Mode. They'll provide you with a cappella tracks that you must remix, and their crack team of judges will do what they're supposed to—judge. If your remix is the best, it'll get featured on the artist's next album. By the time this issue gets to you, only 20 days will be left for the current contest, so rush in your entry or start practicing for the next one.

8.3 Getting A Bite Of Sound

So you want to make a remix but don't know where to turn for a good loop? Be very careful about what you use in your mixes—using a loop without checking its copyright agreement could result you breaking the law without even realising it till someone sends you a hate-mail calling you a pirate. So there's a tip—*always* read the copyright agreement, even if it's a guaranteed free MP3.

Here's a list of sites that offer royalty-free loop and other random sound effect downloads:

Proloops Freeloops section
http://www.proloops.com/freeloops.asp
Though the site's primary function is to let you buy royalty-free loops for your own use, it also has a free section that features around 50 to a hundred free loops every month. The loops will

range from genres like garage and country to weird ones like pot and pan sounds. The free section is definitely quite the teaser: if that's anything to go by, the paid section is probably monumental!

Partners in Rhyme

www.partnersinrhyme.com

A cornucopia of royalty-free music (most of it paid, though), Partners in Rhyme does offer a large number of free sound effects, neatly categorised into categories like ambient, vehicles, animals, human and so on. You will also find free MIDI files, a few free drum loops, and links to sites where you can find free MP3 music.

ACID Planet

www.acidplanet.com

Home of ACID software, ACID planet has a huge collection of free drum and music loops for your track. You will also get a bunch of bonus loops when you decide to enter their online contest.

The Free Sound Effects Index

http://www.stonewashed.net/sfx.html

As the name suggests, the site offers links to free sound effects on the Internet. Some of them are too good to be true, naturally, but you'll actually find yourself led to a respectable number of sites that are quite real and do provide some neat loops.

EchoVibes

http://www.echovibes.com/

Dedicated to helping Web designers bring life to their Web content (as they claim), EchoVibes has a bundle of cool sound effects, all categorised. The site's interface is a little difficult to navigate—the images make no sense if you're running on a high resolution.

Sounddogs

www.sounddogs.com

The name itself inspires you to belt out numbers ("you ain't nothing but a sound dog..") from eras you forgot existed. You can choose from sound effects to vocals to loops, even telephone ringtones. You can also get them in bulk "doggy packs"—themed collections of sounds, though these need to be paid for, unfortunately.

Flashkit

www.flashkit.com

You're going to find a lot of free loops here, but not without some effort—you'll find them hiding among loops that *are* copyright protected, so as long as you keep an eye out, you won't end up breaching any copyright laws.

Psy-Lab

www.psy-lab.com

Though it looks suspiciously like an advertising site (it is, for the most part anyway), some patient trawling will actually lead you to some useful sites with free downloadable music and sound effects.

Computer Music Tutorials

http://www.computermusictutorials.com

Apart from tutorials (as suggested so overtly by the title), you will also find a monthly sound effect pack. For freebie junkies, there are links to free audio editors and recorders as well. You will also find free VST plugins to use with your current editor!

MIDI

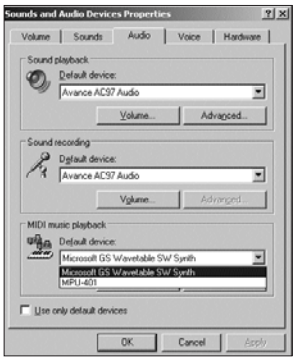
It's been around since we were wee children. First, as a way for musical instruments to talk to computers, then as game music, and now as ringtones on our cellular phones. Here's to the never-say-die technology that is MIDI—the Musical Instrument Digital Interface.

9.1 Introduction

Developed in the late seventies and early eighties, MIDI isn't really an audio format—rather, it's a protocol that defines musical notes in a precise format that computers can understand. This lets musical instruments (especially synthesizers) and computers talk to each other easily. When a musical instrument is connected to a PC via a MIDI interface (an interface that conforms to the MIDI protocol—this could be a serial port or a USB connector), it sends it:

1. A number indicating which note was pressed
2. When the note was pressed and subsequently released, and
3. How hard it was pressed

MIDI *Sequencers* are programs that record the above data and can now play it back at any speed and with any effect you wish to apply. The data is sent to your PC's MIDI synthesizer (which combines all the MIDI information to finally generate a sound). You can see the MIDI synthesizer by right-clicking on the volume icon on the taskbar, choosing "Adjust Audio Properties" and selecting the "Audio" tab.



Viewing your default MIDI synthesizer. For Windows XP users, it's the Microsoft GS Wavetable SW Synth

Wavetable Synthesis

In ye olde darke ages of computing, MIDI music was made up of single, boring tones, much like the ancient black-and-white cell phones. As MIDI grew, the need to emulate different instruments like pianos, guitars and violins became greater, and synthesizers

The great thing about MIDI is its sheer compactness—a 10 KB file can easily hold a minute of MIDI audio, making MIDI sequences the ideal choice for game music and any other application that requires a lot of audio in very little space.

Of course, MIDI wouldn't be fun if you needed a real live musical instrument to create your music, now, would it? You don't need to tinker around with hardware every time—you can choose from a wide range of software to begin creating and editing MIDI sequences, or you can use VST instruments (which we talked about in chapter 8) with your preferred audio editing program.

9.2 Software

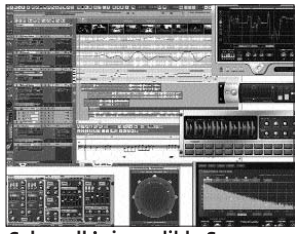
Nearly all MIDI creation software offer you a virtual music keyboard of your own. All you need to do to use these are load up a sample instrument and play away! Here are some essential programs to get you started with creating your own MIDI sequences.

FL Studio

FL Studio—the incredible MIDI maker

This incredibly powerful mixer is also quite capable of creating some really awesome MIDI tracks. And unlike other programs that let you play only one note at a time, FL Studio's unique and user-friendly Piano Roll lets you easily create chords and other effects such as gliding over the keys of the keyboard. It also comes loaded with a bunch of VST instruments, offering a mind-boggling variety of instrument samples. After you've used it for a while, the $99 (Rs 4,300) price tag appears surprisingly small.

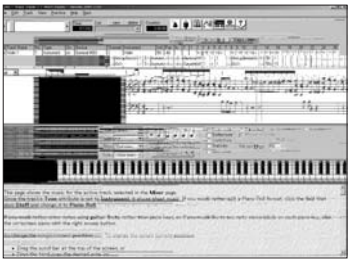
Cakewalk Sonar 5



Cakewalk's incredible Sonar

Cakewalk, too, has been a leader in the world of music creation. Sonar 5 is practically a whole recording studio inside your humble PC—from sequencing MIDI to processing effects.

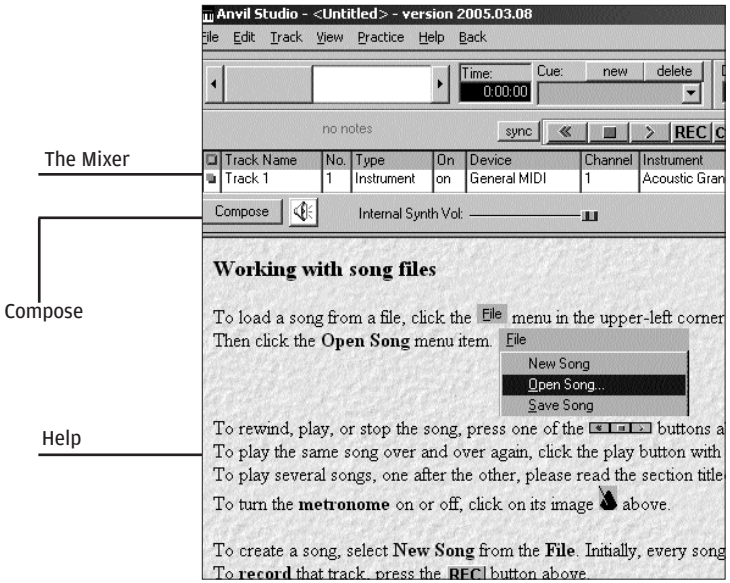
Anvil Studio


Anvil Studio—free!

Anvil Studio lets you create a multi-track MIDI file with incredible ease. It also offers you a large number of instrument samples, so you're literally spoilt for choice. Its most noteworthy feature, however, is the tutorial interface—the bottom half of the screen always contains very helpful tips and instructions on how to use Anvil, so you'll never be lost. And best of all, it's free!

9.3 Creating Your Own MIDI Track In Anvil Studio

Let's use this free MIDI editor to create our own little song. To get an idea of the different areas of Anvil Studio, take a look at the screenshot.



The Lead Track

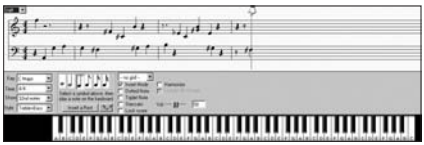
This will the song's main melody, so let's rename it in the mixer by clicking on the track name and calling it Main.

Choosing the track type and instrument

By default, the track type is Instrument—leave it that way. Click under Instrument to bring up a list of instruments you can choose from, and select the instrument. To start playing the song, click on the Compose button.

Composing the Lead Track

The Composer, by default, is a piano keyboard which you can play by either using the mouse to click on the keys or by using your PC's keyboard. You will also find a bar with musical notation, which will make little or no sense if you haven't formally studied music. Thankfully, Anvil Studio's really handy help panel contains instructions to help you out.

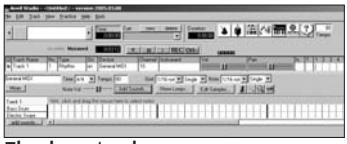

The Composer

If you find the piano keyboard uncomfortable to work with, you can select "Piano Roll" from the drop-down menu at the top left.

Creating the melody is going to involve a lot of experimentation, and can end up as a long and frustrating exercise, but it will be worth it when you finally have your own composition ready!

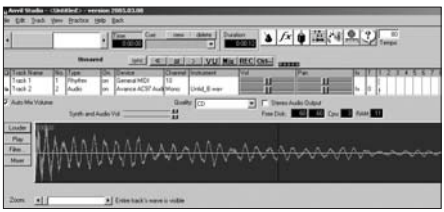
Drums and Rhythms

Now that you've created a melody, it's time to add a rhythm track for the background. Go to Track > Create > Rhythm Track to create a new track.


The drum tracks

In the Compose screen, click on the Add Sounds button to get a list of drums. The most common are the Bass and Snare drums, so you can start with those. You will now see the drums in a multi-track display. Clicking anywhere on these tracks will play the drum at that position.

Audio Tracks


Loading an audio track

If you've got sounds (in the WAV format) on your hard disk that you want to introduce into your song, you should create an Audio track. Go to Track > Create > Audio Track by Importing a .wav file for this. For audio tracks, Anvil gives you the option to add sound effects, should you choose to. Click on "fx" to the right of the track to bring up a list of effects you can apply. Anvil, too, supports the VST plugin architecture, so you can keep adding new effects on a whim.

Mixing them up

To the right of every track, you will find sliders for Volume and Pan. The Pan slider lets you decide how the track is balanced between your two speakers—dragging it to the right will bias it towards the right speaker, and if you drag it to the left, it will be biased towards the left speaker.

Now that you're done with the basic tracks, you can add more instrument tracks for some more background music. For example, you could create another instrument track and choose bass guitar to create some low mumbles in the background. And if you ever get stuck, Anvil's help is right there, so tinker away!

9.4 MIDI Music Online

Easy that they are to make, there's no dearth of MIDI files online—all of them even categorised under various genres of music, artists, alphabetically—it's a mad MIDI world out there. If you've ever had a favourite song, the probability of finding a MIDI version of it is tremendous—whether it's classic rock (you haven't truly heard Pink Floyd's *Comfortably Numb* till you've heard it in MIDI), techno, disco or even pseudo-grunge-garage-pop (we made that last one up). Here's a list of sites you can visit for free MIDI audio.

The MIDI Database

www.mididb.com

Quite suggestive by name itself, the MIDI Database is a, well, database of a wide variety of MIDI files. The front page features the top five MIDI downloads for each genre. The music is a little contemporary and features mostly songs you'd be familiar with. It also has a section on Copyright FAQs, which you must refer to if you intend to use these MIDI files for anything other than personal use.

www.midicenter.com

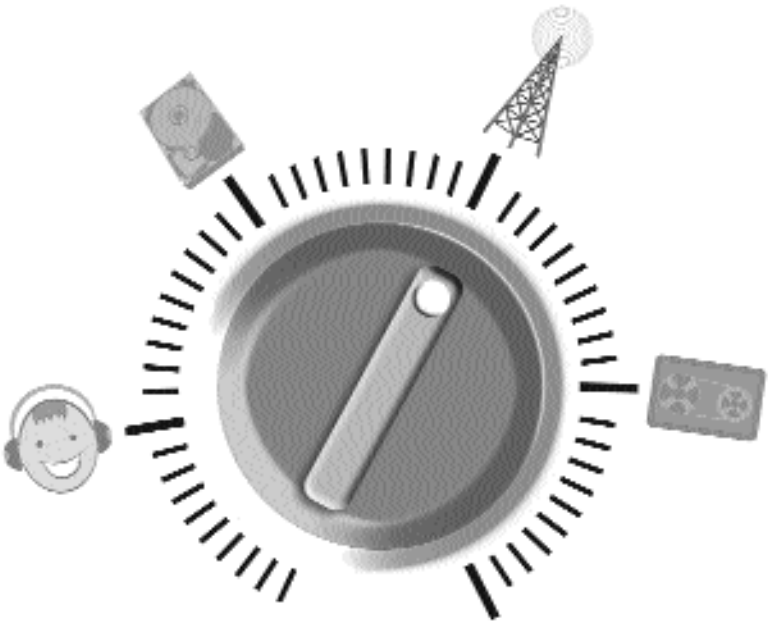
Another MIDI Database, the MIDI Center has a huge database of songs ranging from the run-of-the-mill to weird and unheard-of music. You will find lists of the newest songs, the most popular and the top rated for your perusal.

www.FindMIDIs.com

FindMIDIs features an alphabetically-organised list of MIDI files. One thing we liked about the site was its "Play Random MIDI" button, which was quite educational—it seems there is a lot of terrible music out there just waiting to pounce on you.

www.musicrobot.com

A handy MIDI search engine, Musicrobot lets you search for songs either by song name or band name.



Section III

Keep

Cataloguing Software

Joy and pain; two emotions very commonly felt by everyone who has a music collection spanning eras, genres and gigabytes. Of course it is pride that you feel when you gaze fondly at the rare Beatles mixtapes that you acquired digital versions of. However, it is also agony that accompanies your satisfaction as you browse through your collection and notice that, like The Beatles, it's going to be a Hard Day's Night if you decide to find anything amongst the various files, formats and folders on the hard drive...

Given that your music is stored in various compression formats (MP3, AAC, WMA, OGG, etc.) on various locations on your hard drive it becomes almost a necessity to have some sort of 'arrangement' to your music files. Whether you're ripping music off CDs or downloading it off the Internet, unless you're an uber-geek, it's unlikely that you're keeping it sorted by artist/album/track number. So how exactly do you keep Madonna in one place, Kylie in another, and *still* manage to find them on your computer instantly? Read on...

10.1 Playlists: The Traditional Way

As the name suggests, a Playlist is a list of songs that are arranged in an order to be played. And essentially, that's about as far as a Playlist will go in arranging your music. At the time when media players were being introduced on personal computers, Playlists became an efficient way to keep one's music organised. The most popular formats of Playlists (.m3u and .pls) are basically lists of locations of various media files on your computer. So when you load a Playlist you are giving your media player an address book of your media files.

The advantage of maintaining music on Playlists is that you can make them specific to artist, mood, genre, year, or whatever grouping you want. Playlists can also be made so that your music files play in a particular order that you decide.

10.1.1 Making a Playlist

Playlists can be made using practically any media player. For the purpose of demonstration, we have used Windows Media Player (WMP).

1. Drop all the music files you want in the Playlist into the 'Now Playing List' at the right of the 'Now Playing' screen of WMP.
2. Order them in the arrangement of your choice by keeping the left mouse button pressed on the song you want and dragging it up or down the list.

3. Once done with the arrangement, click **File > Save Now Playing List As**
4. Select the location where you want to save the Playlist. Then, click on the 'Save as type' drop down and select the 'M3U Playlist' option.
5. Type in whatever you want the Playlist to be called and save.

It makes sense to store all your Playlists in the same location

The problem with Playlists is that every time you want to add or remove a song onto a particular Playlist, you have to do it manually; adding the files individually or in groups, and then saving the Playlist again. Also, searching for the right song within multiple Playlists is a pain. Enter—the next generation of music cataloguing...

10.2 Media Libraries

Like a physical library, a Media Library is a well ordered, easily searchable store of media files that is also terribly quiet. It is a feature of most of today's popular media players and is an efficient way of organizing and accessing your music on your computer. What a Media Library essentially does is access information from all the media files on your hard drive and displays the same conveniently making searching for files very, very easy.

A Media Library lists all the songs on your hard drive(s) in a menu that allows you to see all the pertinent information about the files, i.e. song name, artist, album, time, etc. It serves the purpose of a Playlist too as it can sort your files in exactly the way and order you want them.

10.2.1 Sort = Search

The iTunes' search function is extremely user friendly

The best part about Media Libraries is the automatic sorting that the software performs, i.e. as soon as you add files to your library your music is sorted by Artist, Album, Genre, Year, etc. This means that when you search, you can search for all songs of a particular artist, album, genre, year, etc. In fact, most available media players also allow you to sync your Portable Devices with your Media Library so transferring your favourite songs to your Portable Device becomes a sync... er... synch.

10.2.2 Ratings Are Everything

No, we're not being TV show producers here. Media players allow you to give ratings, usually on a 5 star scale, to individual songs or a group of songs you are listening to. This means that you can give the boy band songs in your library (shame on you!) a one star rating, and a five star rating to all your Alanis Morissette stuff! Media Libraries allow you to sort music according to your ratings as well, so you can access all your top rated songs at any given time. You can also change the ratings any time, and any number of times, you like.

10.2.3 Dynamic Playlists

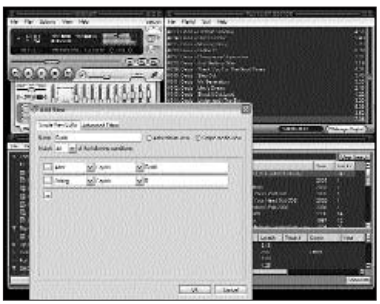
A Dynamic Playlist, sometimes called Smart Playlist, is a customisable Playlist that allows you to access music on the basis of certain pre-decided parameters (you decide, of course!). The reason the nomenclature of this functionality includes the word 'Dynamic' is because as and when more files that satisfy your parameters are added to your library, they get automatically added to your Playlist as well. You can also Edit (simply right-click on the Playlist and select 'Edit Playlist') the parameters of your Playlist at any time.

10.2.3.1 Making a Dynamic Playlist

Dynamic Playlists make accessing favourites very easy. Creating a Dynamic Playlist is even easier. For the purpose of demonstration, we have used the iTunes Media Library feature.

You can select which parameter(s) you want to create your Smart Playlist on the basis of

1. Click **File > New Smart Playlist** or use the keyboard shortcut **[Ctrl] + [Alt] + [N]**.
2. In the menu that pops up select the parameter(s), called 'rules', that you want your Playlist to match. For example, select **Artist-is-<name of artist>**
3. You can add Rules to further modify your Playlist by clicking the '[+]' button
4. You can also specify the number of songs/minutes/hours/ megabytes/ gigabytes you want the Playlist to contain



Winamp's Smart Views also allow multiple parameter selection

5. Select the 'Live Updating' option which will add a new file to the Playlist if it matches all the rule
6. Hit 'OK' and voila!

Winamp (version 5.0 and above) also allows you to make a Dynamic Playlist. It is called 'Smart View' and can be created by hitting the 'Library' button in the Media Library and clicking 'New Smart View'. Just title your Smart View aptly, select your parameter(s) and hit 'OK'.

10.3 Cataloguing Tools

Okay. So now you know what to do and how to do it, but where the heck do you do it?! There are several readily (and more importantly, freely) available softwares that help one organise one's music collection. Here's a look at some of the most popular ones.

10.3.1 iTunes

iTunes is the proprietary media player of Apple Computers, and is fast gaining ground as the most popular media application in the world. Given the dominance of the iPod in the portable audio device market, it's not surprising that Apple also have one of the best media players. Incidentally, iTunes also acts as the sync between the iPod and your computer.

10.3.1.1 You've Come A Long Way Baby

Macintosh software distributed a popular MP3 application called SoundJam MP which was used by most Mac users. When Apple bought the rights to SoundJam, it changed the name of the software to iTunes, made a few modifications and released it in January, 2001. Currently, Apple has released version 6.04 of the software which has several improvements over its predecessors including access to iTunes store in the user interface itself.

10.3.1.2 Compatibility

Originally, iTunes was designed only for the Mac OS but these days it is compatible with computers running Windows XP, 2000 and Server 2003. It is not supported on non-NT versions of Windows like 98 and Me. Linux users can run iTunes using the Crossover Office platform. iTunes can be downloaded for free from www.apple.com/itunes

10.3.1.3 Features, Features Everywhere

With more explorable features than a French supermodel, iTunes is as user-friendly as it can get. The latest release of the software is brimming with cool tools that let you organise, access and edit your media files with German efficiency, Japanese speed and American spunk.

Apart from the regular media player functions (Playlists, Media Library, ripping music, burning to CD/DVD, etc.) iTunes also has several nifty features that make it an absolute pleasure to use.

Syncing

The software syncs seamlessly with the iPod and other portable devices. The Windows version of iTunes, however, can only sync with the iPod. One can transfer selected Playlists to the iPod, and once connected, the software will automatically make the necessary additions/removals to the device.

Podcasting

iTunes allows users to search and download a variety of podcasts onto one's computer. You can also configure the software to check for new podcasts and delete old ones periodically. These options are available by clicking **Edit > Preferences**. The latest release of iTunes also has support for video podcasts and RSS. Users simply need to enter the feed URL in the pop up menu that arises when one clicks **Advanced > Subscribe to Podcast**. One can also access streaming audio and video by entering the URL in the **Advanced > Open Stream** menu.

Party Shuffle

This is a nifty tool meant essentially as a quick Playlist creating DJ aid. The Party Shuffle Playlist randomly selects tracks from the Media Library, or other Playlists. One can also edit the tracks in this Playlist by simply dragging and dropping files into it.

Edit the Party Shuffle Playlist on the fly

10.3.2 Musicmatch Jukebox

Media player using veterans will recall fondly the times when the most effective CD ripping software was Musicmatch. Before iTunes

was introduced for Windows, Musicmatch Jukebox (MJ) was the software provided with iPods to sync with Windows PCs. In October 2004, Yahoo! acquired Musicmatch. A lot of the functionalities seen in iTunes have clearly been 'inspired' from MJ. Like iTunes (how ironic!) MJ also has an online music store, support for Internet radio and portable devices, and a pretty efficient Media Library. With a smartly efficient user interface and clever tools to boot, MJ is an very good media player option.

AutoDJ

This is effectively the Smart Playlist option of other media players. The primary difference between the AutoDJ and other Smart Playlists is that Musicmatch automatically adds related artists to the mix you have built using the 'Musicmatch Music Discovery Engine' which scans the Internet for information on related artists.

AutoDJ is Musicmatch's answer to Smart Playlists

10.3.3 Winamp

Winamp has been around for donkey's years now and terms like 'Playlist' and 'Alicia Silverstone skin' have become popular mainly because of Winamp's acceptance as the media player of choice amongst the masses. Winamp is the Nokia phone of media players—people who use it, usually don't want to shift to other players. Its controls and options are as idiot-proof as can be. Currently, Nullsoft has released version 5.21 of the software, which has, among other things, support for almost all portable devices and support for a variety of streaming content.

10.3.4 AmaroK

Linux users! Worry not! AmaroK is an audio player built for KDE. The software is the popular alternative to applications such as JuK and WMMS. Though it doesn't come bundled with KDE, this will

probably change soon. The latest version of AmaroK (version 1.3.9) has several features that are cool enough to make you want to shift over to Linux, just to use them. For example, using the ID3 tag (for more on ID3 tags, see chapter 11) of a particular file, it can download the full lyrics of the song, along with cover art and even information from Wikipedia about the artist! AmaroK also has a Playlist browser that allows users to scan various Playlists on their computers.

Organising Your Collection

Imagine living in a world where nobody has a name. So if you're standing at a street and you see someone on the other side that you recognise, you say "Hey, You!" And just as the words leave your mouth, all the people on the street turn, and look at you...

Nomenclature, for absolutely everything, is imperative. Imagine if local buses weren't numbered, or if books weren't given titles. Just as going to the destination of your choice, or picking the right book at a library would be a headache, it is likely that with thousands of media files on your computer, finding the right one would be *muchos* effort if it didn't have the right file name.

This chapter explains why you really don't want to listen to something by Boyzone when you clicked on what you thought was something by Metallica, and how to completely avoid this situation.

11.1 ID3 Tags

No, we're not talking about Tom Cruise's secret password in *Mission Impossible*. Essentially, an ID3 tag allows you to store information about the MP3 (ID3 is used only in relation to MP3 files) within the MP3 itself. It's like the library card of a book, except an ID3 tag doesn't leave your MP3 when you "check it out" of your computer.

Let's Get Technical

Metadata! That's what an ID3 tag is. Simply put, Metadata is information about information. Your standard MP3 file is basically a collection of zeros and ones, and its identity in defined by a unique arrangement of those numbers. What an ID3 tag does, as metadata, is add information about that file, to the file itself. This data is then accessed by your media player which reads it out as a song name, artist, album, etc.

Most media players display song information about MP3s on the basis of the information stored in ID3 tags. They also allow you to edit this information and add details such as lyrics, artwork, etc. to the MP3. But the amount and types of information that you can store in ID3 tags depends on what version of ID3 you are using. There are basically two versions of ID3 tags—ID3v1 and ID3v2—but both these are essentially unrelated.

11.1.1 ID3v1

Prior to the 'invention' (or as they day in software, 'development') of ID3 tags, the only information about the contents of an MP3 file that could be saved on the MP3 file were some simple yes/no parameters like 'private' and 'copyrighted'.

Then one day in 1996 this guy called Eric Kemp decided that he really wanted to know which artist he was listening to, and from which album the song that he was listening to was, and, basically, other related information about the track as well. So he developed a program called Studio 3, which added a small amount (128 bytes) of data to the MP3 file itself. This 'tag' was added to the end of the file so that it did not disturb how the media player played back the track. A 128 byte ID3 tag has the following information

- Song title: 30 characters (one byte each)
- Artist: 30 characters
- Album: 30 characters
- Comment: 30 characters
- Year: 4 characters
- Genre: 1 byte

Technically, if you add it all up, it comes up to 125 bytes. The remaining 3 bytes are 'TAG' which is basically, how the media player identifies an ID3 tag! Initially, some media players played a tiny blip of static when they read the tag part of the file but all current players will skip it. Eric Kemp made the byte value of the genre field correspond with one of 80 pre-defined genres.

11.1.1.1 ID3v1.1

Sometime after the ID3v1 tag was developed, another guy, called Michael Mutschler decided that it would be a good idea to know what was the order in which the MP3 files from a particular album were on the album CD itself. So, he used the last byte from the comments field, which hardly anyone used, to store the track number of the MP3 file.

But What About Songs With Long Titles?!

Since the ID3v1 tags had only a 30 character space for song titles, album, artist and comments, song names like *Sending Postcards From a Plane Crash* were simply shortened. Long album and artist names were also similarly shortened. In addition to this, since the genre query was accessed from a pre-defined list of only 80 genres, some genres like *Baroque*, etc. could not be added. So the world waited till eventually, someone came along with a solution.

11.1.2 ID3v2

Incidentally, though both versions of the tag begin with ID3, ID3v2 has hardly any relationship with ID3v1. ID3v2 was designed with the aim of removing the restrictions that the ID3v1 tags had, and also, to add more information to the MP3 file. An ID3v2 tag allows users to add, apart from the regular Id3v1 tag information, lyrics, pictures, Web content, etc. to the MP3 file. But that is not the only difference between the two versions of ID3 tags.

ID3v2 tags store information in what are called frames. Every small portion of information in an ID3v2 tag is stored in different frames; so the artist name, album name, lyrics of the song, artist picture, etc. are stored in separate frame. As opposed to the limited amount of content in an ID3v1 tag, each frame in an ID3v2 tag can have a maximum size of 16 MB! The entire tag can have a size of up to 256 MB! Also, whereas an ID3v1 tag is placed at the end of an MP3 file, an ID3v2 tag is placed at the beginning. This is particularly useful when it comes to streaming MP3s on the Internet, as this bit of information is read immediately, allowing the listener to know details of the song before he/she hears it. Though there are some standard frames, like artist, lyrics, URL, etc. some media players allow you to add your own bits of information about the song as well. In addition, the ID3v2 tags can be linked to music databases like CDDB (more on CDDB later in this chapter) to get information automatically from the Internet.

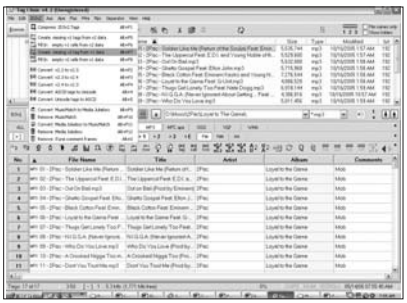
There are three currently versions of ID3v2 tags—ID3v2.2, v2.3 and v2.4.

11.2 Managing Tags

ID3 tags (v2) let you store a host of information about your MP3 files on the MP3 file itself. This allows you to have a truly enriching listening experience as your media player will display the pertinent information in its listener interface. Most popular media players today also allow you to edit the information that is stored in the tag. Winamp, for example, lets you change information for both ID3v1 and ID3v2 tags simultaneously. All you have to do is right click on the file in the Playlist window and select 'View file info'. Alternatively, you can use the keyboard shortcut [**Alt**] + [**3**]. Winamp also allows you to copy information from the file's ID3v2 tag to the ID3v1 tag, and vice versa.

Winamp has a very easy to use tag editor

Tag Clinic is a very helpful application for managing tags, especially if you're finicky about capitalisations, spellings, etc. of your tags. It can also be used for editing the tags of a batch of music simultaneously. In addition, it has a lot of 'smart' functions. For example, it will automatically fill in information missing in a file's ID3v2 tag from its ID3v1 tag. Tag Clinic can also be used to edit track information for a variety of formats including M4A, AAC, WMA and OGG.



Tag Clinic has a variety of 'Smart' functions

Media players arrange music on the basis of information they read in the files' ID3 tags. Here's a short tutorial on how to tag your music in iTunes.

Tagging Files in iTunes

1. Add the MP3 files you want to tag in your Media Library by pressing [Ctrl] + [O]
2. Right-click on the music file that you want to tag, and select 'Get Info'
3. The menu that opens shows you a summary of the track you have selected with information like the file type, file size, bit rate, etc.
4. Select 'Info' and type in whatever fields you find necessary for the song
5. You can also fill in lyrics and artwork by clicking on those buttons
6. The 'Options' menu allows you to adjust the volume of the song, give it a rating, and change some other song details
7. If you want to tag a bunch of files at the same time just select all the files you want to tag ([Shift] + [Left Click]) and once again select the 'Get Info' option in the right click menu.

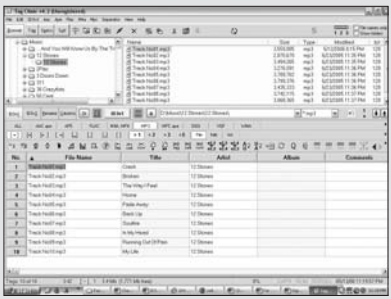
iTunes has a simple tagging menu

Some Simple Tips to Organise Your Music

Let iTunes do all the hard work for you

Organising files and organising tags should not be done independent of each other. It's like keeping your CD covers in one place and keeping your CDs somewhere else. Listening to hundreds of MP3s before finding the one you want really doesn't make much sense. It's advisable to keep songs of a particular artist in that artist's folder on your computer. iTunes pretty efficiently organises your music collection in **Artist > Album** folders. All you have to do is click **Advanced > Consolidate Library** and iTunes will automatically arrange your music in the iTunes music folder. You can change the directory of this folder by clicking **Edit > Preferences** and selecting the Advanced menu.

It is ideal if you use some standard format of track naming. For example, Title-Album-Artist, or some variation of that sort. So your filenames will go something like Wonderwall-Morning Glory-Oasis.mp3. This makes identifying the file easy without opening a media player. Tag Clinic (v4.2) is a very nifty application that allows you to rename your files based on the information stored in the ID3 tags. So as long as your files are tagged with some basic information (song title, artist name, etc.) Tag Clinic will change the filenames for you. You can download Tag Clinic from **www.kevesoft.com.**



Tag Clinic automatically renames MP3 files on the basis of their ID3 tags

11.2 Cataloguing Optical Media

As they say, first there was the Gramophone... The natural 'evolution' that audio playback formats have seen has led to the birth of the Audio CD. The Audio CD is basically the great-great grandson of those good ol' vinyl records. When vinyl was the standard, music wasn't recorded on records as 'data files'. Grooves were made on the records that were the analog signals that a Gramophone's needle picked up and amplified. Essentially, the case was similar when the audio CD was developed. Except here, the signals were digital, and the needle was replaced by a laser. Music wasn't stored on an Audio CD as data files. So apart from the inlay that was provided with the disc, there was no other digital identity that the songs had.

This meant that when you ripped the songs on to your computer they were given names like Track 01-76432908.mp3. So what was needed was another source from where the information about the songs on the CD could be accessed.

11.2.1 CDDB

CDDB stands for Compact Disc DataBase. When you play a Compact Disc in your computer, the media player that plays the songs accesses this database to get information about the songs on the disc. But how does the database know what CD you're playing? What happens is that an identification of the CD is created on the basis of the length (time) of the songs, and their order on the disc. This is then used to access information about the whole CD, or, in case of a CD whose 'identity' is yet new, to submit such information.

CDDB used to be a free database, but the project was sold (to a company called Gracenote) and the terms of the license were changed. This basically meant that developers needed to pay for the use of the database. Also, since the database was accessed on the basis of track lengths and their order, the database could not deliver information about compilation discs.

11.2.2 Freedb

Developers of media players soon shifted to use freedb, which, as the name suggests, is a free database. However, the name CDDB is still used as a generic. Freedb is essentially based on the original CDDB concept, but has an open license (GNU General Public License) which means it can be accessed for free.

Syncing With Portable Players

Convenience and customization; two ideals that have been the cornerstone of every scientific development since man invented the wheel. Everything from cornflakes to industrial equipment is made so that its user gets exactly what he wants/expects from it. Likewise with the MP3 player...

12.1 Radio se MP3 tak

When radio programmes were first broadcast in India, loudspeakers were set up near popular public areas so that people could hear local folk music. At the time, owning a radio set of your own meant you ate caviar for dinner and had four orderlies to take care of your Rolls. But as radio has pervaded boundaries and classes, it has also expanded its horizons. Speaking in the context of music, today there are over 9,000 radio stations in the USA playing every conceivable genre of music. Radio was the reason The Beatles were as big as they were. Music charts were decided on how many people requested for the songs of a particular band. But the power to choose still rested with the people who owned the radio station.

And then came the Gramophone... From the Gramophone, to Audio CDs to buying MP3s online; the point of people being able to purchase music is that they get exactly what they want. Just like cornflakes. What has happened is that we are living in a world where we decide what we want, and that's what we get. So from listening to any random song on the radio, you can choose to listen to whatever you've got on your iPod.

12.2 Walk Man, Walk

Everyone had to have one. Sony's Walkman was the most wanted portable device in almost every country in the world. It actually allowed people to listen to music while walking! The concept of portability exploded on to the world and Nintendo made millions selling their Gameboys. After the Walkman, no portable device really had the 'cult' following that Sony exploited so profitably. Until the iPod. The iPod was and is the only true 'cult' device of our times. But along with the iPod, a casual listener of music has the option of purchasing several portable music devices that suit every budget. And these days, with convergence becoming the keyword for everything so much so that your car can also have a TV in it, portable music is not restricted just to MP3 players. These days, cell phones double up as portable music players as well. In fact, if you've been watching TV recently, you'll notice both Sony Ericsson and Nokia advertising their

cellphones with MP3 players. Motorola, not to be left behind, has already introduced the SLVR line of phones which have iTunes built in! And you thought your mobile was only a video camera, word processor, instant messenger and oh, did we mention, telephone?

12.3 Syncing Portable Devices with Media Players

Here we will look at how you can sync your MP3 player with some popular media applications.

12.3.1 iTunes with iPod

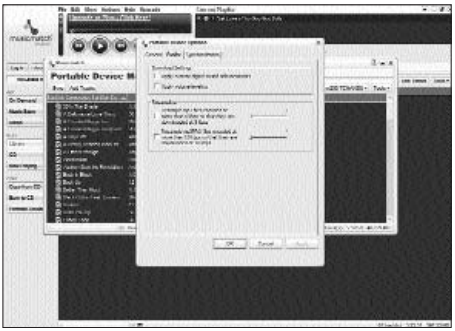
Apple is the master of interactive applications. In fact, they take interactivity to a completely different level. iTunes automatically syncs with your iPod every time it's connected to your computer. Unfortunately, the Windows version of iTunes will allow you to sync only with the iPod while the Mac version allows you to sync iTunes with other portable players as well.

Every time you add a new song to your Media Library on iTunes, the song automatically gets added to your iPod as well. Also, all the 'Information' on songs that you have changed in your Media Library including ratings, gets automatically updated in the iPod when it's connected to your PC. iTunes also allows you to automatically copy any changes in your Playlists to your iPod. You cannot however transfer files from your iPod to your PC. Don't fret though, a simple Google search will through up several third party tools that allow this functionality for the iPod. The automatic update function of iTunes can be turned off, for a manual transfer of files to your iPod, by clicking Edit>Preferences and selecting the iPod menu. You will need to have your iPod connected to your PC to access this menu though.

12.3.2 Windows Media Player

You can sync most portable media devices with Win-dows Media Player 10. Just connect your device to your computer and click 'Sync'

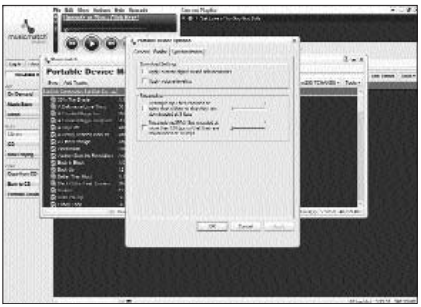
in the main interface. WMP usually detects the device and displays all the songs currently on the player. To transfer files to your device, click 'Edit Playlist' in the Sync interface menu. It will show you a list of all the media files on your computer sorted by Artist. You can select the sorting parameter in the drop down menu. Once you have selected the files you want to transfer click 'Start Sync'.

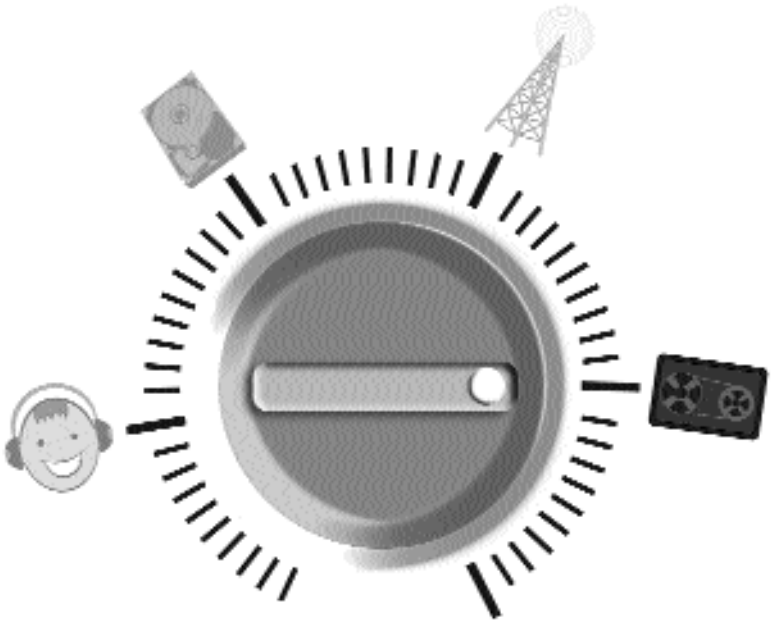

WMP has the option of Automatic updates as well

Like iTunes, WMP does not allow you to transfer files from the device to your PC. WMP also has the option of automatic updates to your device. Simply click 'Set Up Sync' in the Sync interface menu, and select the 'Automatic' option.

12.3.3 Musicmatch Jukebox

MJ also has a pretty nifty sync option with portable devices. Connect your device to your computer and select 'Portable Device' in the Copy menu of the main interface of MJ 10. It detects the device and displays all the tracks on it. You can add songs to the player by clicking 'Add Tracks' and selecting them from your Library. MJ has a lot of additional functionalities as well, apart from the regular Automatic Updates, etc. Click on the 'Tools' drop down and select 'Settings'. Here you can configure a variety of options including volume leveling and overwriting duplicate tracks on your device.

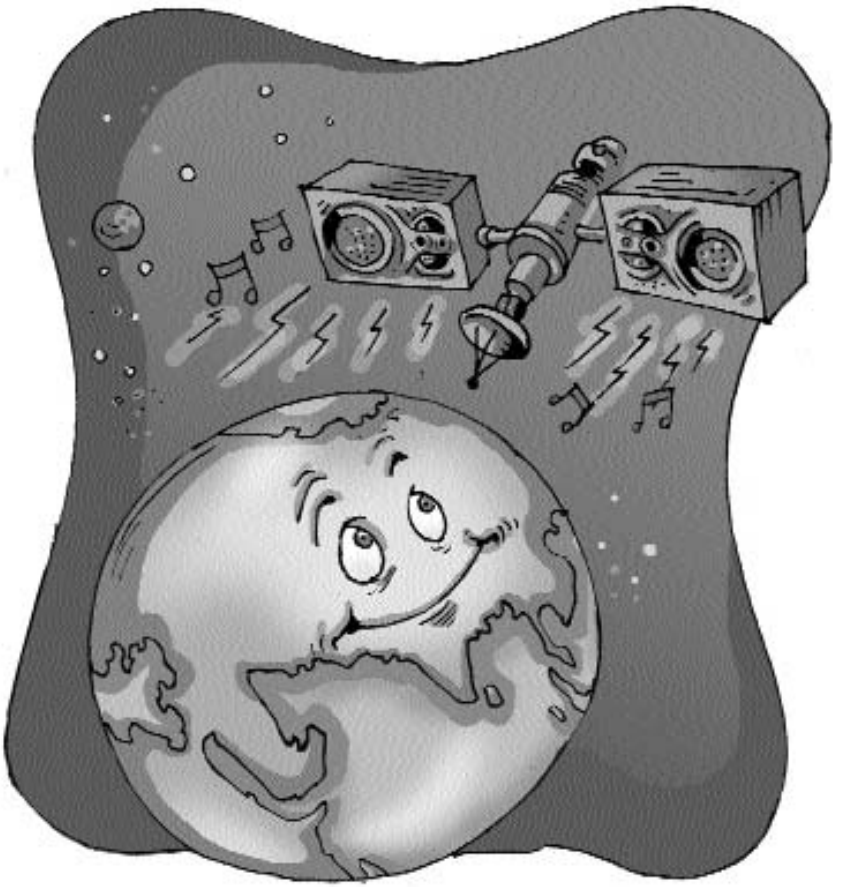

MJ offers additional options for devices



Section IV

Share

Online



You've done your tinkering. Mixed everyone from Asha Bhosle to Guns 'n Roses into this awesome soundtrack that will keep the party rocking into the wee hours of the night. Or you may be more than just a geek with audio gear pouring out of your ears: a genuine A R Rehman ready to take the music world by storm.

The question you have to ask yourself is: Do you have the guts to publish? Fine. You feel you're not ready for prime time. But the itch just won't go away. You want to share your files. Tell the world you're a music maestro. And you want to do it now! This is what you do:

13.1 File Sharing

Online file sharing has a colourful and controversial history. Peer to peer (P2P) technologies have evolved over the years, in response to the various legal and social challenges of sharing copyrighted material. In the early days, we had the likes of Napster that used a centralised server to maintain searchable lists of files and directories of all users connected to the network. Individual users would search for the file they wanted to download and request it directly from a machine on the network. The subsequent legal battles finally shut down Napster in this form but it also paved the way for decentralised distribution through file sharing programs such as KaZaa, LimeWire, BearShare and others.

13.1.1 P2P

These days, file sharing happens via several different P2P networks (file sharing protocols); some of the most popular ones are Fast Track, eDonkey, Gnutella and BitTorrent. P2P file sharing relies on some method to pull different pieces of a file from various users (nodes) on the network. This splits the resource and bandwidth burden of sharing a file among several nodes, which (theoretically, at least) increases the efficiency of file sharing. While the principles are similar, the methods used by each network result in varying efficiencies, primarily depending on the type of connection you have. Thus, while BitTorrent may be most efficient for a broadband user, Gnutella or eDonkey may be more suited for those on dialup.

13.1.2 Legal Eagles—Is P2P legal?

This 64 million dollar question is still being fought over, with no

clear winners on either side. Detractors say that file sharing hurts sales and that you are breaking the law. Proponents of P2P argue that file sharing actually helps sales and the "fair use" provisions of copyright law makes it legal. Both trumpet numbers and research studies supporting their claims. And that's just a surface scratch on the debates that rage!

As you can see, nobody is really clear on the way forward. At least not yet. However, current copyright law is clear enough. You cannot distribute copyrighted works without the permission of the copyright owner. At best, file sharing is in a quasi-legal state where you maybe punished if caught sharing copyrighted material without permission.

While we at *Digit* are a crazy bunch, we like to spin our loonies on the right side of law! Likewise, we would encourage the entire *Digit* community of readers to not break the law. Before sharing copyrighted work, check the terms of the copyright. Most artistic work (music, movies etc) and closed source software are usually not shareable via P2P. That said, there is still plenty of shareable material left over. Nearly all freeware, shareware and open source software is shareable. Works in the public domain or those whose copyrights have expired are also shareable. Music and movies released under a Creative Commons license are shareable. Pick out what you want, open your P2P client and go bleed your bandwidth with the good stuff!

13.1.3 P2P Clients

With the exception of BitTorrent, which we will tackle in the next section, sharing files with a P2P client is as simple as designating a folder as "shared" and dropping all the files you want to share into that folder. There are tens of hundreds (if not thousands!) of P2P clients out there. Choosing one which suits your requirements and personality is a matter of trial and error and you will need to try a few of them out before you find the one which fits. One word of caution, though: avoid those which come bundled with adware. Other than taking up available bandwidth and making simple

browsing a pain, adware are also notorious for hogging processor and memory resources, effectively turning your machine into a bullock cart. Look at the open source alternatives. They are adware-free and offer as good or superior functionality. Some of the more popular ones are:

- KaZaa Lite—This is a "clean" version of the popular KaZaa P2P client and contains no adware, spyware or any other potentially harmful software. It is especially easy for beginners. It is no longer being updated but every version of KaZaa Lite is available for download at http://tinyurl.com/rala6.

- Shareaza—A Windows-based, multi-network client that supports download from any of the following networks: eDonkey2000, BitTorrent, Gnutella, Gnutella2.

For a more comprehensive comparison, visit Wikipedia. For a list of P2P clients, visit http://tinyurl.com/fbbvk, and for BitTorrent clients, visit http://tinyurl.com/9svye.

13.1.4 P2P etiquette 1—Don't be a leech!

Because P2P is all about file sharing, it is considered good etiquette to leave your P2P client open when you are not downloading anything. This will allow other sharers like yourself to retrieve the files they want from your shared folder. A person who regularly downloads stuff from the network and does not upload anything is known as a leech. Some of the newer P2P software also tries to discourage leeching by enforcing a "share ratio," which is the ratio of upload vs. download traffic. This is especially true in BitTorrent downloads, where trackers require users to maintain a minimum share ratio. So, within the limitations of juggling for bandwidth with your 56k dialup connection or staying within the transfer limit of your broadband connection, be good—don't be a leech and try and share as much as possible.

13.1.5 P2P etiquette 2—Don't kill the LAN!

File sharing is also bandwidth intensive. On a LAN, depending on the number of simultaneous uploads and downloads, a P2P client can

quickly take over the bulk of network traffic slowing down everything else. If things get out of control, this could lead to file sharing being banned on your LAN. To prevent that it would be a good idea:

1. not to use the server or supernode mode
2. to limit downloads and uploads to one file at a time
3. to schedule downloads to off-peak hours
4. not to use P2P clients with adware as they can generate additional traffic even when nothing is being downloaded or uploaded

13.2 BitTorrent

Unlike other file sharing protocols, BitTorrent does not require the entire file to begin sharing the file. BitTorrent splits a file into smaller fragments which are uploaded to different peers (users). The protocol is smart enough to request the rarest fragment first from peers with the best network connections. This increases the overall efficiency of the "swarm" (a group of peers sharing a full or partial BitTorrent file) and makes for faster downloads and propagation of the complete file to as many peers as possible in the shortest possible time.

Also, unlike other file sharing protocols where you simply drag a file into a shared folder, BitTorrent requires some additional steps to create a "torrentable" file. There are four elements involved in making your file available via BitTorrent:

a) A .torrent file. This is a metadata file containing the names, sizes, and checksums of all the pieces that make up the shared file or directory.
b) A seeder. This is a peer who has a complete copy of the actual file being shared. When you first make your file available via BitTorrent you will be the seeder.
c) A tracker. This is a server that coordinates connections among the seeders and peers. Clients report to the tracker, which in turn informs them of other available peers. Note that you can

also create a tracker-less torrent as explained in §13.2.2.

d) A Web server that stores the .torrent file and makes it available to other users. When you are informing your friends you will send the link to download the .torrent file.

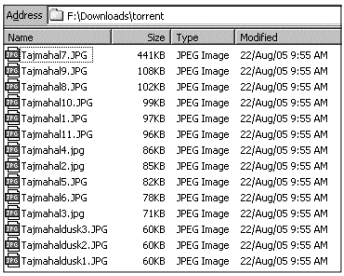
You should also note that it is best NOT to zip or rar your file/files/directory before torrenting. Most users delete the zip file after extracting and hence are unable to reseed the torrent.

13.2.1 DIY: Create a torrent

You can use any BitTorrent client that you are comfortable with; the process of creating a torrent is similar across most clients with some subtle variations emphasizing some aspect or the other. For this DIY exercise we will use the µTorrent client which is relatively easy to use with a simple interface. Creating a torrent is a five stage process:

a) Prepare file / files / folder

Copy all the files you want to torrent into a single folder. For this example we are going to share some pictures of the Taj Mahal.



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Note: Make sure you have expanded all compressed (.zip, .rar, etc.) files you're going to share.

b) Register on a tracker Web site

There are quite a few tracker Web sites out there, but all of them require registration. We've chosen to register on DataGalaxy (datagalaxy.net), which is the largest legal BitTorent site in the world. Once you've set up your account and logged in, you will need the Announce URL in the next step. Click on the Upload link at the top of the page. You should see a page like this:


XXXXXXX

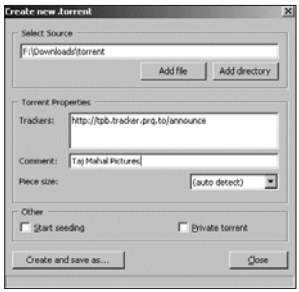
Copy the Announce URL to Notepad and keep it minimised.

c) Create the torrent

Open µTorrent and go to File > Create a New Torrent. You will get a dialog box like the one on the right. Click Add Directory and select the directory where your files are stored. Paste the Announce URL you copied to Notepad. You can add a comment to the Comment box if you wish to. Accept the default "autodetect" for Piece Size, do not check the Start Seeding and the Private Torrent boxes. A new dialog box will pop up, as on the right.

XXXXXXX

Now click the "Create and save as..." button. Give an easily recognisable file name and save the torrent file along with the original files to make it easier to find the torrent.



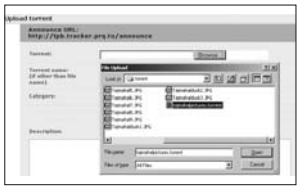
XXXXXXX

Click Close once the progress meter reaches the end and the "Close" button is enabled.

XXXXXXX

d) Upload the .torrent file to the tracker site

To upload the torrent file we need to go back to the upload page on the tracker site, in our case, datagalaxy.net. On the upload page click the browse button and select the .torrent file.



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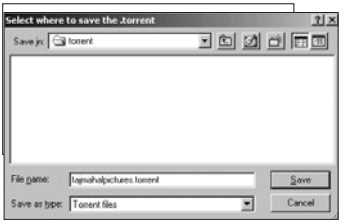

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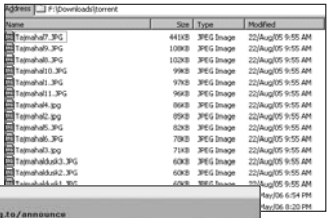
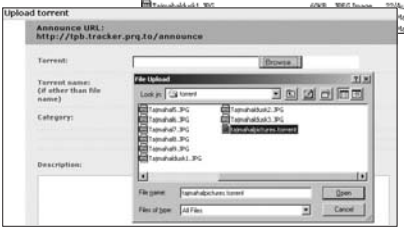
Give a descriptive file name for the Torrent, an appropriate Category and the description of the contents of the Torrent. Click Send.



e) Seed the Torrent

To seed you will have to first download the torrent from the site. Click on the Torrents link at the top of the page and search for the torrent. Click on Search to narrow down the list to your torrent. Click on the floppy disk icon in the Dl column and save the torrent file in the same directory as your original torrent file (created in step c.) and the source files. This is very important; many people mess up their first torrent by not doing this. When you save the file, your directory should now look something simi-



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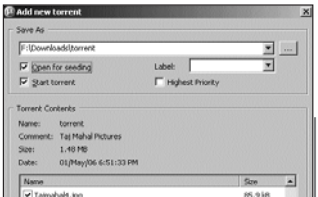


downloaded from The Pirate Bay. In our case th
Mahal Pictures.torrent". In the resulting "Add Ne
box, navigate to the .torrent file we created in st
As" section as shown below.

Make sure the "Open for Seeding" and "Star
boxes are checked and click OK.

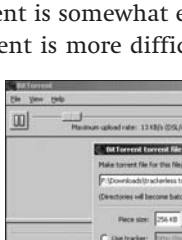
Congratulations! You are now seeding your f

You will need to leave µTorrent or your BitTo
for a sufficient length of time for the seed to p
peers. Send an e-mail to all your friends with the
torrent file. Once enough seeds spread to other p
down your client.

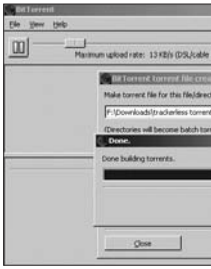
13.2.2 DIY: Create a tracker-less torrent

One of the annoyances of BitTorrent has been th
a site to host the tracker that co-ordinates file sh
peers and seeders. Many people don't have a We
public tracker sites provide a useful service, the
trackers begins to take a heavy toll on the bandw
owners. To circumvent this problem the concep
torrent was introduced.

Creating a tracker-less torrent is somewhat e
other peers to locate your torrent is more diffic
creating a tracker-less torrent
first and then discuss the ways
in which you can expose your
torrent to peers. Since the cur-
rent version of µTorrent does
not support creation of track-



rent.



XXXXXXX

a) Prepare the file / files / folder

This step remains the same as in creating a tracker-based torrent. Collect all your files (or file) into a single folder. Make sure they are uncompressed, and fire up the BitTorrent cli

b) Create the torrent

In the BitTorrent program, click on File > Mak press [Ctrl] + [N]. In the resulting dialog box select the files you want to torrent. For this exar to make a torrent of firefox.exe. The resulting s like this.

Leave the piece size at 256KB. You can incr your file size is very large (hundreds of MBs) mended to leave it at 256KB for smaller (10 to 2 the "Use DHT" radio button and click Make. Th be created and you will get a result screen as s

Click the "Start seeding" button and you're c

Like in the case of the tracker-based torrent leave our client open for a sufficient length of ti reseed your torrent. However, discovering a trac a bit more difficult than tracker based torren ways BitTorrent clients contact peers with track

In the first method, a BitTorrent client will information with other peers it contacts. Duri each tracker-less torrent capable client will infor ability to host such torrents. These clients are kn (or peers or users). DHT, which stands for Dynar the method by which tracker-less torrents

Someone searching for a tracker-less torrent will input his search term in his client and this is sent to all the peers the client is in contact with. The peers in turn will send out the query to other peers until a matching torrent is found. This is then reported back to originating peer for further action. This process however is slow; "peering," as it is called, will take time, and some searches may never return a successful result.

The other method, which is somewhat faster in building the peer network, is to first built up a "peer routing table" (contact details of peers) by downloading tracker-based torrents. Since the tracker contains information about other peers in the torrent, your peer routing table will get built that much faster. You can then use this initial peer network to query for your tracker-less torrent. One should note that there are no reliability guarantees with a tracker-less torrent and the ability of peers who want your file is curtailed by the "best effort" principle. That is, BitTorrent will make the best effort to connect a peer to your tracker-less torrent but there is no assurance of it happening.

That said, if you are sufficiently patient and leave your client and net connection up and running, and assuming you have a ready fan base to download your files, eventually your torrent will get reseeded across many peers. This is applicable to both tracker-based as well as tracker-less torrents. The only difference is that reseeding your torrent will be much faster with a tracker-based system than a tracker-less system.

13.3 Storing Online

The only downside with file sharing through P2P is the need to be constantly connected to the Internet. With a large number of files being shared or torrented this can quickly hog up quite a bit of both download and upload traffic which in turn may result in huge Internet bills. If this describes you, or if you are simply not comfortable with the idea of P2P file sharing, you might want to

look at online storage as an option.

After nearly winking out of existence following the dotcom bust, online storage is back. Earlier, users had to deal with a simple web based upload that was slow as well as erratic. No more. Online storage solutions are increasingly sophisticated with many of them providing custom upload applets, Web APIs for integration with other applications, and RSS feeds for publishing updates. There are hundreds of online storage solutions catering to every mix of user needs. Since we are interested in sharing files with others, the solution that you finally pick should offer file sharing with friends as well as the general public. Some of the ones which caught our eye are:

Streamload (www.streamload.com)
With a whopping 25 GB of free storage, Streamload just falls behind Multiply which offers unlimited free storage. There are some restrictions on monthly download (max 10 MB per file, max 100 MB per month) but for the beginning file sharer this can be more than sufficient.

Box.net (www.box.net)
Offers 1 GB of free space with no upload or download restrictions. We really liked the feature of being able to e-mail a link of your file for download by public with the option of password protection. You will need to be premium user (read paid!) to use this feature. Premium users also have private sharing, that is, sharing with other box.net users.

Allmydata (www.allmydata.com)
Uses a slightly different approach by giving you 1 GB of free online storage for every 10 GB of storage you give them from your hard disk. The hard disk space you give them is used as a virtual distributed RAID network hard disk.

eSnips (www.esnips.com)
Similar to box.net, this one gives you 1 GB of storage for all your

files including photos, audio and video.

Multiply (www.multiply.com)
Strictly speaking, Multiply is not a storage solution but a "personal webspace" for free, unlimited hosting of your photos, blogs and videos, along with a personal calendar and "My Reviews" section.

Also, for a huge list of online storage sites, look at http://tinyurl.com/eg83y.

13.4 Broadcast

It is said that the Internet is a great leveller. Nowhere is this more evident than in the publishing of personal music. No longer do you require expensive hardware and software to set up an Internet radio station that streams music from your home PC to your friends or anyone else for that matter. The collection of tools that we review here enables you to set up your own Internet radio station and stream music or any other audio file 24x7. Listeners use the Internet to tune into your station and listen to your selection of songs. So, what are you waiting for—put on your RJ hat and get cracking!

13.4.1. Mercora

Mercora allows you to broadcast your personal music collection over the Internet and listen to broadcasts from thousands of other music lovers as well. You can't download the songs but you can listen to them "live"—they are streamed to your computer from other users. Similarly, your songs are streamed to other listeners who tune into your "radio station." To broadcast your music collection, do the following:

1. Install the application
Go to www.mercoranetworks.ca/download.asp to download and install the international version of the Mercora client application. This is a standard Windows EXE installer. After the installation

completes it will ask you to log in with your Yahoo!, Google, MSN or AOL account. This login will also pull your contact address book from the particular service, and Mercora will ask you to e-mail at least one of your friends informing them about Mercora. Do that, and you're in.

2. Set up your Media Library
As with other media players, Mercora can scan your hard disk and import all the songs on your PC into its media library.

3. Set up Channels and Go!
You can group your music collection into a maximum of five channels. Drag and drop your music files into each of the channels to set up your channels. You can also record a 90-second audio introduction to your webcasts by clicking on the "Quick Bump" button and using your microphone to record the intro. You are now ready to go! Users wanting to hear your songs will browse the Mercora network to locate your station and stream the songs to their computer.

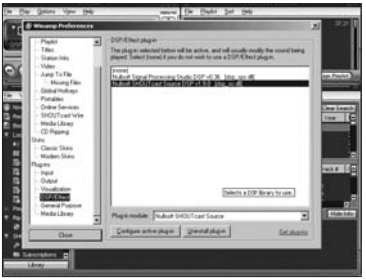
13.4.2. SHOUTcast

A bit more complex than Mercora, SHOUTcast consists of two components: an audio server called SHOUTcast Distributed Network Audio Server (DNAS) that distributes the streaming audio, and an audio source via a Digital Signal Processing (DSP) plugin to Winamp called SHOUTcast Source.

The DNAS SHOUTcast server requires a dedicated IP address and plenty of bandwidth to handle the audio streams that users will request. Since this is outside the scope of most normal users, we will not get into how to set up the server, but will instead look at how to use the DSP Plug-in to connect to a SHOUTcast hosting server.

1. Download the plugin
Before you install the plugin, ensure that you have the latest version of Winamp (you will find it on any *Digit* CD). Next, go to

http://tinyurl.com/4x2 to download the latest version of the plugin. This is a standard Windows executable file—all you need to do is run it to install the plugin.

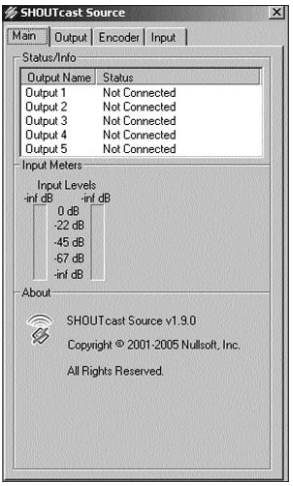


XXXXXXX

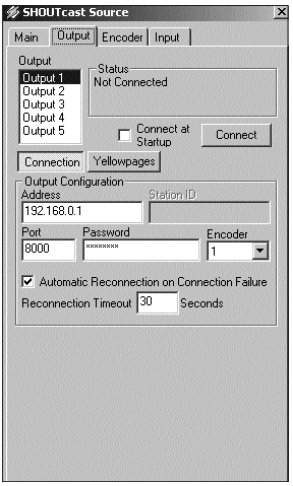
2. Configure the plugin

Before you configure the plugin, you will need to obtain the following bits of information regarding the PC that will host your SHOUTcast server:

- Server IP Address
- Port Number
-



XXXXXXX

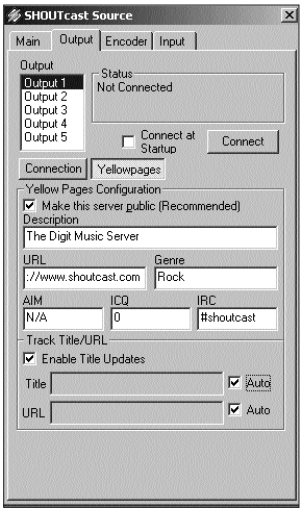


XXXXXXX

Password (if any)

Start Winamp and select Options > Preferences, or press [Ctrl] + [P]. This will bring up the preferences dialog box. Select “DSP/Effect” from the right pane and your screen should look like this.

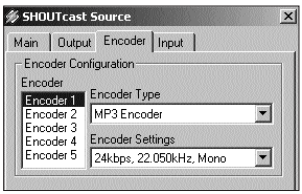
Winamp's DSP plugin configuration



XXXX

The SHOUTcast Source Window Output Tab

Select "NullSoft SHOUTcast Source DSP v1.90" (or whatever is the latest version) and click "configure active plug-in". This will pop up the SHOUTcast source window as in the screenshot on the left below. Click on the Output tab and select "Output 1" as in the second screenshot.

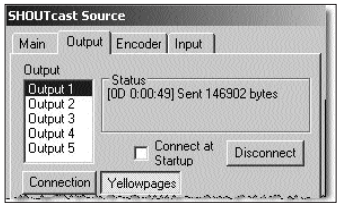


XXXX

Enter the SHOUTcast server IP address in Address field, the server port number and password in their respective fields. If you're going to use your own PC to broadcast your collection, accept the defaults. Accept the default values for Encoder (1), Reconnection Timeout value (30 seconds) and check the "Automatic Reconnection on Failure" box. Next, click on the

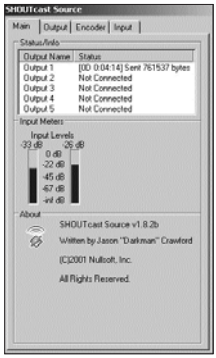
XXXX

Yellow Pages button and enter a description that will get listed on SHOUTcast directories around the world.



XXXX

Check the "Make this server public (Recommended)" box, enter a descriptive name for your server, enter the URL for the SHOUTcast directory, specify a genre for your music, provide any AIM, ICQ or IRC channel information if you want to chat with your listeners, and check the boxes for "Enable Title Updates"



XXXX
XXXX
XXXX

Next, click on the encoder tab as shown on the right. In this screen, you configure the encoder settings that will stream the music to your server. For now, accept the default values of 24 kbps, 22.050 kHz Mono for MP3 Encoder. Once you've established your audio stream you can experiment with higher configurations. Basically, the higher the values, the higher the sound quality, but the bandwidth required is greater, as also increasing the strain on your system resources.

You are now ready to stream. Switch back to the Output tab window, click the "Connect" button. Your screen should now look like this.

Upload an MP3 file and play it. You should be able to see the bytes being sent out as shown on the next page.

You can also switch to the main window to see a graphical representation of your streaming file. To get your friends to listen to the stream all you need to do is send them the URL which they can play from within Winamp. The URL will be of the form: http://servername:port number (for example, http://digitshoutcast

.com:8000).

13.4.3 Podcasting

Podcasting, unlike Mercora or SHOUTcast, requires that you do have a Web site where you can host your audio files. A "podcast" refers both to the content and mode of delivery, and is usually used for audio talk shows and less for music distribution. While the file format can be any audio file format such as MP3 or WAV, the delivery of the podcast is where you see the difference. Podcasts are normally delivered via the RSS or Atom syndication formats, which enable your listener population to subscribe to your RSS or Atom feeds and listen to your talk show as and when they are posted. Podcasting involves the following steps:

1. Creating your podcast audio file

The first step in podcasting is to create your audio content. You can use Audacity or any of the other tools we have reviewed in the earlier chapters to create your audio talk show. Record your audio and add any music effects you wish to use. Once done, save your audio file as an MP3 and note down the file size in bytes. To get the file size, right-click on the MP3 file and select Properties. For example, if your system shows the file size as "3.89 MB (4,078,961 bytes)", you should note down 4078961 without the commas.

2. Create the RSS Feed File

The RSS feed file is actually a text file in the XML format. Similar to HTML, you will need to use tags to specify the various parameters of your RSS Feed. Use Notepad to copy the below code and modify according to your requirements.

```
<?xml version="1.0"?>
    <rss version="2.0">
    <channel>

    <title>Digit Podcast</title>
    <link>http://www.digitpodcast.com/mypodcast.mp3</link>
    <description>My first podcast</description>
```

```
<language>en-us</language>
<copyright>2005</copyright>
<lastBuildDate>Today's Date*</lastBuildDate>
<webMaster>youremail@digitpodcast.com</webMaster>
<ttl>1</ttl>
<item>

<title>Digit Talk Show - Monday</title>
<description>Here's Digit's Monday Podcast.</description>
<pubDate>Today's Date*</pubDate>

<enclosure url="http://www.digitpodcast.com/mypodcast.mp3"
length="4078961" type="audio/mpeg"/>
</item>
</channel>
</rss>
```

*The date should be in the format ddd, mm dd yyyy, hh:mm:ss +0530. The +0530 will indicate that you are five and half hours (India) ahead of GMT. If you are in a different time zone, change the +0530 to your corresponding time zone. For example, if you are podcasting from Dubai on May 3rd, 2006 at 2:08 PM, your date information would read something like this: Wed, May 03 2006, 14:08:00 +0400

Note: Make sure you use a text editor such as Notepad, not MS Word—the RSS file should be without any hidden formatting information and should be a plain text file.

Save the file with a .rss extension, say digitpodcast.rss.

3. Upload the RSS file and the MP3 file

You should now be able to upload the RSS and MP3 file to your Web site now. Use an FTP program or some other upload utility to upload the file to your website. Make sure you have the correct folder locations for the MP3 file in the enclosure tag in your RSS file. In our example the enclosure tag was:

<enclosure url="http://www.digitpodcast.com/mypodcast.mp3" length="4078961" type="audio/mpeg"/>

This indicates the mypodcast.mp3 file is in the main directory with a file length of 4078961 bytes.

4. Validate the RSS file

Now go to an RSS validator and enter the address to your RSS file (for example, http://www.digitpodcast.com/digitpodcast.rss) to verify that your RSS file is without errors. You can use http://rss.scripting. com/ or http://validator.w3.org/ to validate your RSS file.

Once validated, you can now provide a link to the RSS file on your Web page, or e-mail the link to your friends or mailing list.

You are now podcasting!

People subscribing to your feeds will automatically see your new feed in their favourite RSS reader.

Note: You can also use automatic RSS feed creation software to publish your RSS feeds.

Share Offline

If you're one of those with tens and hundreds of audio CDs scattered all over the place with no clue as to how to organise the clutter, then CD ripping and burning is for you. This section will walk you through the steps involved in ripping the songs from your music collection and burning an audio CD from your digital music collection. We will also show you how to create cover art and use some software and hardware tools to label your CD.

14.1 Ripping And Burning CDs

Ripping, as the name indicates, is the process of extracting audio files from your CDs. Audio CDs are normally recorded in a "lossless" format such as WAV. This is an exact replica of the sound as it was recorded. The ripping process compresses and encodes the songs in a "lossy" format such as MP3 where some audio information is compromised. (See chapter 2 for more on formats). CD burning is the process of writing files to a writeable CD using CD writing software. For MP3 files, the process of ripping and burning has been made somewhat simpler by media player software that enable convenient ripping and burning from within the program itself. There is some difference in the ripping and burning speeds for the free and paid versions. Popular choices for media players include Windows Media Player, iTunes, Musicmatch Jukebox, Winamp, RealPlayer and many others. Thankfully, the procedure followed is mostly similar, with a short learning curve to get used to the user interface. To show you how to rip and burn CDs, we've used Musicmatch Jukebox, which you can download from http://musicmatch.com.

14.1.1 Ripping

Insert your audio music CD into the disc drive, open Musicmatch Jukebox, and click on the "Copy from CD button". The "Recorder" window will pop up and Musicmatch will extract all the song information for your CD as shown below.

If you are connected to the Internet, you can let the album information download from the online CD database (CDDB). If Musicmatch can't find the information or if you aren't connected, you can manually input the details as well.

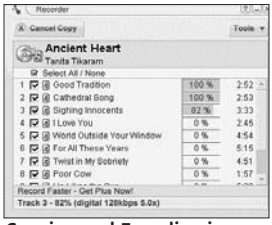
The Recorder window populated with a song list

To verify that the encoding settings are optimum, click on Tools > Settings to open the Settings dialog

box as on the right. You can use this dialog box to modify various recording settings. For now, we will accept the default settings after verifying that the recording will be at 128 kbps—a good balance of file size and sound quality.


Recorder Settings

Close the Recorder Settings dialog box and click on "Start Copy". The recorder will now start copying the tracks on your CD to your hard disk as shown below.



Copying and Encoding in Progress

Soon, the songs will have been copied to your hard disk and will be available in your media player's library.

14.1.1. Burning

Burning is just as easy with Musicmatch. Insert a blank CD into your CD writer. Click the "Burn to CD" button to bring up the Burner Plus dialog box.

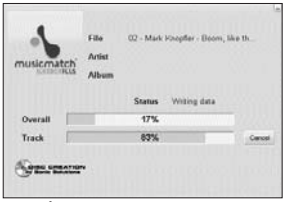
Songs in Media Library

There are on-screen prompts throughout to get you through a basic burning session. Drag and drop the files you want into the Burner Plus window. The software will inform you when the CD has reached maximum capacity, so you can be certain that you won't drag in more files than can be burned.

Files Ready to Copy

You are now ready to burn the CD. You may also choose to explore the various options under Tools to see what else

you can do. For now, accept the default settings and press "Burn". The burn process will now start and display the dialog box on the right.



Burning Songs to CD.

It is best not to run any other applications during burning and wait for the process to complete before using the PC again. Once the burn process is completed, Musicmatch will alert you. Your CD is now ready for distribution!

14.2. Creating CD Cover Art

Cover art can give your CD package a professional and compelling look that will keep people interested enough to listen to your work. It also serves as a vehicle to reflect the theme of your compilation using engaging graphics, pictures and text that, when used appropriately, will create a powerful impression.

14.2.1. Designing cover art

Generally, the CD cover can be considered as composed of three elements: the cover card or insert, the tray card and the CD face label.

The cover insert is what people see first when they pick up your CD. This will have the track listings, artwork, and photographs of you (and your band) and could be in the form of a booklet with the other details like lyrics and information about the CD contents. The tray card sits under the (usually black or white) CD tray. It should be similar in artwork to the cover insert, and should be folded at the spine so that people can read the title along the edge of the CD. The CD label, again consistent with the graphics on the insert and tray card, will be printed or stuck on the CD face.

You can use a combination of artwork and photographs to give a distinctive impression of your sound as well as provide a recognisable identity for yourself and/or band. Photographs can be rela-

tively inexpensive, especially with the proliferation of multi-megapixel digital cameras that can be directly transferred into your graphics software with little or no loss of color information. If you are keen on artwork, and you find that you aren't up to speed in that area, you could try roping in a friend who knows graphics design, or visit one of the graphics design schools in your area. Senior-year students should be more than willing to provide you with eye-catching designs at a fraction of the cost of professional design shops. You can also scour the Internet for royalty-fee artwork designs.

When working with images, make sure you're using a minimum resolution of 300 dpi. Higher than that is always better! Colour information and details tend to get lost below 300 dpi, making your printout look shabby. Similarly, the choice of text and font styles should also be given careful consideration. Remember that your cover art is a combination of the graphics image as well as the superimposed text. While the text should be legible and easy on the human eye, it should not crowd out the rest of the artwork, unless you have a very strong reason for that stylistic choice.

Choosing a font style is no easy task. You cannot just slap on any old font. If you are clueless about what fonts to use, a good idea maybe to check out other CDs in your genre and look at the kind of fonts and artwork those artists are using. It might give you an idea of what works and what will not. Some cover art has an instant direct appeal. Others just slip past you without catching your eye. When using dark colors or a background filled with images it might be difficult for the text to stand out on its own. In that case, it would be good idea to use a solid color box and embed the text inside that to make it stand out and not get lost in the background.

14.2.2. The software

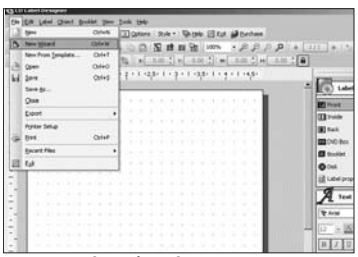
You will need graphic design and desktop publishing software to design your artwork. For best results, you may need to use a combination of graphics and image editing software before getting

your final output. Some of the popular choices include Photoshop, InDesign and Illustrator. However, depending on the exact type of artwork you use, you may be able to get satisfying results with even just one of these programs. Get your hands on the May 2006 edition of *Digit* to get an in-depth how-to for working with Photoshop.

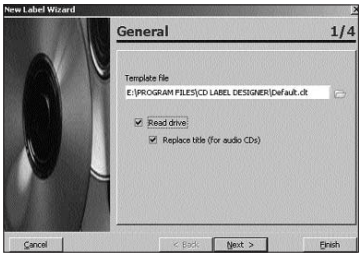
Some programs have special inbuilt features and Wizards to help you in designing the artwork for CD covers. This can be big help as it will save you hours of sweating over your CD jewel case measuring the dimensions, trying to get the sizing right. Additionally, there are many CD cover and label software that will take over from where the graphics software stops. You can, in most cases, import the image file and directly print on plain or specialised paper and stickers that can be then fixed into your jewel case. Two of the most popular label creation software are Easy CD & DVD Cover Creator (www.easycoverdesign.com) and CD Label Designer (www. datalandsoftware.com/cdlabel/). Both these programs can work with images (to some extent) and text, but ideally, you should import your ready-for-printing image file and use that for printing. Both programs have a Wizard interface to make it simpler and easier for you to quickly get your work done. Let's look at CD Label Designer's Wizard to see how it handles the printing of cover and label design.

Open the program and click on File > New Wizard, to bring up the dialog box as on the right.

Accept the default settings for the design template and let the software read the titles from the CD.

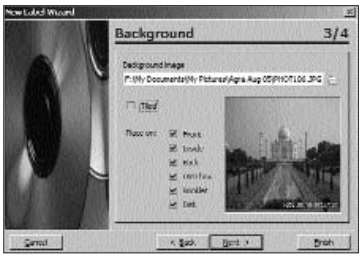

Open up the Wizard

Give a title for the CD and specify where all you want it to be printed. The software has the "Inside" checkbox cleared, indi-

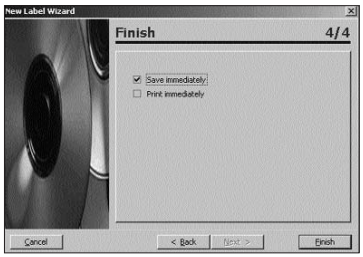


Wizard Step 1

Wizard Step 2



Wizard Step 3



Wizard Step 4

cating that the title won't be printed on the inside "side" of the cover insert. You can leave the title blank and clear all the checkboxes if your text is already in your image file. Insert your graphics file at this stage and specify where it should be printed. You can now choose to save and/or print in this step. We have decided to only save for now to review the results in the program before printing.

Click Finish, and CD Label Designer will automatically check the CD in the drive to identify the song titles. You can now review the labels in Label Designer and make any additional changes required before printing. For printing, you need to pre-cut stationery for the various elements that make up the cover art. Be prepared to waste a few sheets till you get the alignment right with your printer.

CD Titles Extraction

14.3. LightScribe

One of the main problems with CD face labels is getting the alignment exactly right. Even if you do have a label fixing applicator, the alignment may go off, or bubbles might form between the label sticker and the CD face, spoiling your sticker. One solution is to use LightScribe (www.lightscribe.com), a hardware-based device that uses specially coated CD-R, DVD+R and DVD-R discs to laser-etch your CD face artwork without all the above-mentioned hassles.

To use LightScribe you need the following:
- A LightScribe-enabled CD or DVD-Writer
- Specially coated writeable CDs or DVDs
- A LightScribe-compatible label creation software
- The LightScribe system software

LightScribe comes as part of regular CD and DVD-Writers, and are available from many popular vendors both as internal as well as external disc writers. Visit the site and follow the links to find out vendors who can provide you with LightScribe-enabled devices in your area. LightScribe discs are regular writeable CDs and/or DVDs but with a special gold coating on the face that will react to the laser etching process. The artwork, however, will only appear in black and white or greyscale as of this writing. The company says they are planning to bring out colour background discs this year (2006). LightScribe-enabled label creation software will recognise the presence of a LightScribe disc writer and can send your print output directly to the device for laser etching. You can try out SureThing SE (www.lightscribe.com /files/setup.zip), a free label creation software.

In addition to the above, you also need the LightScribe system software. This is normally bundled with your hardware or the label creation software. A universal version is also available along with an extended print contrast utility and label templates in the support area of the LightScribe Web site (www.lightscribe.com/support /index.aspx).