

RecordLabel

PHYSICAL > DIGITAL

SOFTWARE SERVICES

- Digital Downloads
- Digital Booklets
- Dynamic Images
- Interactive Documents
- Metadata Tagging / Ingest
- Web Feeds
- Automation Scripting
- Custom Programming

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In a nutshell

Affordable software engineering support for small record labels is hard to come by, even from India!

Yet converting physical CD production elements to digital assets can largely be automated.

If you have a back catalogue of jewel case booklet PDFs/images that need converting for iTunes, or lack the means to create tagged MP3/AAC/FLAC/ALAC files from CDs or DDPs, or need to consolidate legacy Excel or text file metadata into a database, or wish to auto-generate artwork or documents for marketing, or just need general software support; then this service is for you.

1 Preamble

1.1 Purpose

To describe low-level software support for SME record labels selling digital music files online. That means web development rather than web design.

1.2 Experience

Multimedia programming experience gained at Sky, Sony, Press Association, and a career in developing static and mobile telecommunications and user interfaces at NEC, Nortel Networks and in the City. I have a solid engineering background and a degree in electronics. I use the latest technologies to fulfil requirements with attention to detail and quality.

1.2.1 Background

- Toccata Classics (record label, part-time): software support described here; webmastery
- City: developed front-end user interfaces for back office trading applications
- Sony: developed PCI video scene detection software for digital asset management system
- B Sky B: developed back-end management interface for Sky Text
- Press Association: developed front-end content interface for Digital Teletext
- Nortel: worked on Finite State Machine engineering and multisite PDF automation
- NEC: worked on OSI Lower Layer 1 and kernel scheduler firmware for GSM phone
- Other software, embedded firmware, and hardware design & development positions

Technologies include all the major Unix and Web tools and techniques, notably the LAMP stack; Apache mod_rewrite; jQuery; Ajax; XML; HTML5; responsive CSS; low-level audio, image & PDF tools; etc. But I prefer not to work with Microsoft servers.

I am also musically aware, which helps with this kind of work, with a Diploma in Piano Performance, Grade 8 (distinction) in Organ, and Grade 8 in Music Theory. I am actively involved in church music, choirs, accompanying, music arranging, and music technology.

1.2.2 Specialisms

My expertise lies in web development, bespoke programming, automation scripting, and database engineering. I do not possess any marketing or business aptitude – I just provide software support.

Web development encompasses much more than web design and social networking. Those aspects involve web application deployment, markup and styling but any real programming is minimal. As an experienced software engineer, I develop solutions that go far beyond the ability of web designers and generalists. I can provide big label features for small label enterprises.

I hope this document conveys the essence of the services I can offer but it is by no means exhaustive.

1.3 Summary

This document describes some of the software and automation processes (workflow) I developed while working for a classical music record label over six years.

The software implements the Model and Controller components and the View API of the Model-View-Controller (MVC) pattern in a three-tier architecture.

The workflow executes the processes involved in digital download production as atomic functions which can combine to provide series automation.

Digital downloads, done properly, are not straightforward. Even big labels, like ClassicsOnline (Naxos), deliver sparsely tagged, poorly compressed downloads and inadequate titles. I settled on Hyperion Records as exemplar for my work, because of their excellent technical implementation and presentational detail.

The software, although geared for classical music, is label independent and extensible. Classical albums comprise Works and Movements, which impact the metadata, database schema and digital audio delivery. Popular music albums comprise straight tracks, which simplifies the model. The software I developed can support both styles.

Some, but not all, of the processes listed below are common to any label providing in-house digital downloads. I can automate many aspects, including file transfers, remote host commands, legacy system interaction and more, besides workstation processes.

There is a lot involved and much to say, but this document is necessarily brief. It contains some jargon but I can't expand on everything – the target audience includes technicians who know what they are looking for.

1.3.1 Services

Most of the following are batch processes that can be automated – even for complete catalogues:

- robust Paranoia III ripping of physical CDs
- DDP track & info extraction
- TOC, MCN, ISRC extraction from PQ subchannel & DDP info
- subchannel CD-Text (ASCII & 2-byte) extraction from CD
- CD-Text extraction by DDP info parsing
- metadata upload to music databases
- streaming MP3 audio clips with effects; longer clips for longer tracks
- lossy compression MP3 & AAC generation using best quality VBR
- lossless compression FLAC & ALAC generation
- richly tagged ID3 / Vorbis / MP4 metadata, including cover image
- title granularity: Album; Works; Tracks (movements) with attacca (no break) detection
- database schema supporting feature-rich music & artist searches and presentation, including taxonomy keywords
- SQL database ingest of album, work, track, composer, artist, document, etc. data
- reformatting of saddle-bound/perfect-bound PDF booklets for sequentially paged, trimmed, fast web view, digital booklets
- iTunes booklet creation; interactive PDFs with rich media; EPUB generation
- creation of jewel case sized cover and inlay PDFs for home burning
- automation of image tasks: CMYK to sRGB with ICC, resizing, thumbnails, caching etc.
- image map generation
- scripted FTP upload of all digital assets
- validation of uploaded assets
- data view caching for efficient display
- free Open Source utilities deployed throughout, plus self-developed code
- I can handle many other aspects of Label requirements, including sales cart processes

2 Overview

2.1 Aim

In physical CD production, the label receives mastered digital audio and finalised artwork to pass on to production plants, which produce stamped or disc-on-demand packaged CDs.

In-house digital audio production does not need to interfere with that process: it can be completely independent. But it is very time-consuming to do manually, involving many chained and distinct processes – hence the need for automation.

So the aim is to automate the generation of digital assets, metadata, and website content from the same sources that produce physical CDs, and to engineer other aspects to requirement.

2.2 Inputs

The input sources are:

- mastered audio: a DDP 2.x file set or low error rate CD-R premaster, or other source
- finalised artwork: PDF/X print resolution cover, inlays, booklet, case etc.
- artist and group photos, biographies, material for added interest

2.3 Outputs

Output elements include:

- richly tagged lossless and lossy compressed audio files for download sales products
- sound clips of representative length
- cover images, people photos, etc. automatically sized, annotated, or post-processed
- digital booklet PDF files, optimised for fast web-view, reformatted for iTunes or converted to other formats
- structured data feeds to web front end, for album detail presentation, catalogue listings, filtered collections etc.
- data feeds pertaining to peripheral information: catalogue, composers, performers, etc.
- data feed of automated track, work and album prices
- data feeds for Web syndication

2.4 Physical

Main processes of physical CD production:

- **DDP / CD-R premaster** → replication plant → glass master + stamped CDs (high quantity) or disc-on-demand CD-R (low-quantity)
- **PDF/X artwork** → prepress RIP → booklet & inlay printing
- Assembly, packaging & distribution

2.5 Digital

Digital download production uses the SAME input sources as physical production (shown **bold**).

No extra work is required of the mastering engineer or artwork designer:

- **DDP / CD-R premaster** → automation scripts → tagged lossless and lossy compressed audio files + metadata → web & database servers → downloads & data feeds
- **PDF/X artwork** → automation scripts → reformatted digital booklet etc. → downloads & asset feeds
- raw photo images → manual cropping/editing → asset ingestion → asset feeds
- payment gateway and digital goods delivery

The automation scripts I developed are command-line apps for batch processing, as opposed to Graphical User Interfaces. They delegate to Open Source software tools to perform specific tasks.

Example Open Source multimedia tools include Cdparanoia for secure CD ripping, SoX for sound processing, ImageMagick for image manipulation, Ghostscript for PDF creation. Many such tools are deployed, driven by standard platform shells and utilities. I use the OS X platform and integrated Xcode development environment, where POSIX compliant Unix facilities are installed as standard, and specialist software easily installed.

3 Details

3.1 Audio

Automation works best when CD-Text is embedded, so the label should try to include metadata with other information sent for mastering. This is good practice anyway, despite poor player support. A Cue Sheet or high level interface then ensures textual information propagates through downstream processes.

3.1.1 CD Ripping

- robust Paranoia III ripping of CD-R or production CDs to lossless track files
- TOC, MCN, ISRC decoding from Q subchannel data
- ASCII & 2-byte CD-Text decoding from R-W subchannel packs

3.1.2 DDP extraction

- track file extraction from audio image
- MCN, ISRC, CD-Text extraction by parsing generated DDP info
- PQ timing data extraction

3.1.3 Discrete audio masters

Sometimes track files are provided as 24-bit or 16-bit masters, usually without metadata. In this case timing data is obtained from the audio file header.

3.1.4 Audio data convergence

Regardless of the audio source – ripped or DDP or discrete – a uniform set of intermediate files result:

- lossless track audio files (AIFF)
- parsable PQ timing record, simulated if missing
- TOC file or CDRWin Cue Sheet containing MCN, ISRC, Indexes, CD-Text
- track durations: MSF frames rounded to whole seconds

Double byte CD-Text encoding is converted manually at this stage if auto detection fails.

Missing data can be provided manually at this stage, or after database ingestion.

From the intermediate data other files are generated:

- untagged, compressed, lossless audio track files (FLAC) from which all audio assets are generated
- SQL ingest file, for populating database tables with metadata, timings etc.
- fingerprint files, for keying and feeding third party music metadata databases

3.1.5 Music aggregation

I use fuzzy logic to split track titles into Works and Movements, which works quite well, with minimum manual intervention. CD-Text is often worded to make this possible. This saves a lot of time. It is done at the data convergence stage.

This allows complete musical Works to be sold as a single logical product, as well as complete Albums and single Tracks. SME labels don't usually provide this level of granularity.

3.1.6 Promotional audio clips

These are heavily compressed Constant Bit Rate MP3s for streaming to HTML5 and Flash players, like jPlayer and SWFObject Plugin for jQuery.

The algorithm is complex. It delivers clips that are always shorter than the track length but longer for lengthy tracks – music enthusiasts appreciate a decent taster. The start time can be set. The clip is silence-trimmed, with fade-in if it starts into the track, and fade-out.

The SoX tool can produce even more elaborate clips by concatenation with audio effects, e.g. skip 1-minute – fade-in – 30-second play – fade-out – skip to 08:23 – 2-minute play – fade-out. This is useful for long tracks where the music takes time to develop.

Audio clips of multi-movement works are possible by concatenating clips of the movements.

Audio clips are generated in the workflow. All clip parameters are easily changed.

I added a similar facility to generate Ringtones, but with different parameters.

3.1.7 Promotional audiovisual samplers

Multimedia samplers can be similarly generated, either automatically from database filters or by a web form tool or other means. A sample slideshow video is attached to this document – see 3.3.3.

3.1.8 Lossy audio downloads

For MP3 I use the well-regarded LAME encoder. After a lot of research, I adopted best quality Variable Bit Rate (VBR) as the encoding of choice. Some argue that 320kbps Constant Bit Rate (CBR) is better, but the goal is compression not opinion; uninformed audiophiles associate big numbers with superior quality. Good labels like Hyperion use VBR.

AAC format can be produced easily – the workflow is simply a chain of plugin operations. Apple's Core Audio encoder is known to be best for AAC, and that is no problem on OS X.

Ditto for Vorbis and other contained formats if there is open software support for the containers, e.g. Ogg and MPEG. This also applies to lossless and uncompressed formats.

3.1.9 Lossless audio downloads

FLAC and ALAC are supported, and as stated above, other formats can be added easily.

3.1.10 High-resolution audio

Ditto for 24-bit studio masters etc. Digital downloads are just files.

Personally I consider this level of quality for humans and players is a market-led gimmick!

3.1.11 Attacca

Attacca tracks present a problem: applications like Windows Media Player and Spotify insert gaps, which spoil the listening experience.

The kind of attacca where a gap is most disturbing presents as a sudden cut-off in the audio wave, which can be detected automatically. My system flags attacca tracks in the database.

One solution is to sell works with attacca movements en bloc, i.e. to give the punters the option to play joined-up movements as single work downloads.

3.2 Metadata

3.2.1 Database

I developed a generic schema broadly modelled on the massive Rovi metadata database which feeds AllMusic and other metadata feeds: music data, people data and category data. It is comprehensive and flexible, and lends itself to rich cross-linking, filtered searches and taxonomy keywords.

This is not the place to describe the database schema in detail, but the main tables are:

- albums; works; tracks – data pertaining to the music
- contributors – data pertaining to composers, performers, groups
- documents; images – data pertaining to text & graphic assets
- categories; terms – tags used to classify data
- associations – used to link and order information
- virtual tables (views) – composite web data feeds; dynamic pricing; digital delivery; etc.

3.2.2 Global databases

A better approach might be to take control of populating global music databases and caching that data on the label server. That ensures accurate data propagates globally from the outset. In practice it would be at the expense of granularity because less information is stored. A hybrid solution would work best.

In the early days I added experimental support for FreeDB (originally CDDb, now GraceNote) and MusicBrainz. They use acoustic fingerprinting from TOC data for metadata lookup.

All global metadata databases have limitations, e.g. some don't support Composers, and many don't support Works & Movements. It is a compromise at best.

Importantly, if there's an API for automated metadata ingestion, then I can interface to it.

This applies to iTunes delivery and other playlist providers: I can customise to requirements.

3.2.3 Internationalisation

A problem, which narks me immensely, is the lazy Americanisation of titles and names containing characters outside the A-Z alphabet. I went to great lengths to ensure internationalisation is observed at every stage, from data ingestion to audio tagging and website presentation. Unfortunately distributors screw it all up, then propagate their errors to GraceNote, iTunes, Spotify, Amazon etc. and it all gets out of control.

The software I use and write all supports UTF character encoding. Diacritical marks and other alphabets are rendered intact. Indeed, I included database table fields for both native, e.g. Cyrillic, and anglicised names.

3.2.4 Tagging

ID3 tagging of MP3 files is a can of worms, with no formal standard, poor compliance and unreliable tools. The most widely used version is ID3v2.3, which is the version I settled on, with UTF-16 encoding. Reliable automated ID3 tagging in Unicode is tricky. The workflow tagging is comprehensive and includes cover art.

FLAC tags, or 'Vorbis comments' are straightforward and easy to implement. I wrote a script to tag or retag FLAC files on the server, avoiding unnecessary file transfers. Again, cover art is included.

ALAC audio uses standard MP4 container tagging.

3.3 Documents

3.3.1 Digital booklets

Physical CD booklets are typically saddle-bound 2-page spreads for jewel cases, or perfect-bound pages with a spine for slipcases, or some other layout. Perfect-bound are sequentially paged; saddle-bound are paged for back-to-back folding. The booklet PDFs are CMYK mode prepress quality, or we might have to work with proof quality files. PDF v1.3 has flattened transparency; later versions use live transparency.

Digital booklet PDFs are RGB mode, optimized for fast web view (linearized), sequentially paged.

Converting physical CD booklet PDFs to digital booklets is fiddly but can be automated, provided they contain properly defined box values (PDF/X compliant files always do). Conversion involves normalizing the source PDF, cropping spreads into single pages, then concatenating in page order in RGB colour space.

The workflow I developed can auto-detect formats – whether for standard jewel cases, larger booklets for double jewel cases, slipcase booklets – and produce correctly sized digital booklets from prepress masters or proofs.

These can be further processed, e.g. resized, formatted for iTunes, converted to text, RTF, HTML, EPUB etc. I felt it useful to append the back inlay, which often contains the track list or works list.

Document information includes title, subject, author, creator, producer, keywords, creation time.

By default, PDF encryption is deployed to disallow extraction or modification. It adds a degree of security. I included digital booklets with all multi-file digital downloads (albums and works).

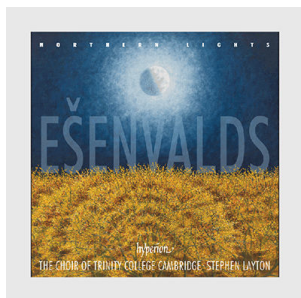
3.3.2 iTunes booklets

Regular booklets are almost square: 121 x 120 mm (W x H). The iTunes specification requires 11" x 8.264" – slightly smaller than US Letter size.

Clearly the cost of creating another layout dissuades labels from doing so. So what they do is produce a custom front cover to the iTunes spec, but merge in the inner CD booklet pages simply enlarged. The aspect ratio is very different, so around 68 x 210 mm of margin area results.

It is easy to generate iTunes booklet PDFs automatically in this manner from the CD booklet PDFs described above. A background image can be layered behind the content to make the margins less prominent, and the square content block can be positioned at one side, or centred. It is also possible to overlay other information in the margin space, such as advertising, or corporate blurb, or interactive elements (see next section).

The example on the right shows two pages of a Hyperion iTunes booklet. The cover designer has left enough bleed to make the background image suitable for both jewel case and iTunes booklets. The narrower jewel case cover is shown on the left. For iTunes inner pages, the square jewel case content block is centred, and a background image strip is retained in the left margin. This is their house style. Any style can be automated – and run off for back catalogue albums too.



3.3.3 Interactive documents

Additional information can be overlaid when generating iTunes digital booklets, including:

- album information: summary blurb; recording dates & locations; release info; barcode; etc.
- cover thumbnails of similar albums; albums by the same composer; series details; etc.
- general label advertising; subscriptions; promotions
- label information and logo art
- links to related material
- embedded audio clips and other rich media
- form controls

Annotations and interactivity can really enhance a PDF document: links can target PDF or Web locations; low resolution audio can play samples; form buttons can execute JavaScript actions.

Below is a simulation of a jewel case booklet converted to an iTunes booklet with overlaid annotations and interactivity. Here, the original booklet content is aligned left and the right margin is used to show some of the information listed above. Interactive features include links, a text note, a slideshow video with audio product clips, and an attachment (the video file).

SYMPHONIE DES MYSTÈRES

Note by the Composer for the First Performance

Since my reading of Saint Teresa of Avila and Saint John of the Cross, of Jacques Maritain and Étienne Gilson, since the example of my teacher Manuel de Falla and of my friend Roland-Manuel, since the influences of my first spiritual director – Father Jean-Pierre Altermann – and of my beloved religious men and women of all orders, I have wanted to sing what my faithful Catholic heart has always sung privately. Thanks to the generous commission of Pierre Lacroix for the Festival of Saint Bertrand de Comminges, I can now do so publicly for the Glory of God, for the love of His Son and of all His children in honor of the Holy Virgin, Mother of God and of us all.

Even though these titles of the fifteen musical meditations on the fifteen mysteries of the Rosary are different from the liturgical titles, the essence and the symbols remain the same. In some ways they are less intimidating – at least for the composer – from the titles already so gloriously illustrated by our great composers. In addition, they offer – for the composer as well as for the listener – the possibility of free-association without losing frame-work or origin.

Sarrià, November 1993

JOAQUÍN NIN-CULMELL: A BIOGRAPHICAL OUTLINE

by Martin Anderson

Joaquín Nin-Culmell's refined and elegant music points to the gentle equanimity of his character rather than to his disruptive childhood; he seems to have suffered far less from it than did his elder sister, the writer Anaïs Nin. He was born into a dysfunctional but musical family. His father, the composer-pianist Joaquín Nin y Castellanos (1878–1949) was born in Cuba, like his mother, the singer Rosa Culmell, but grew up in Barcelona. Nin-Culmell's parents were living in Paris when Anaïs was born, in 1903; a second child, Thorvald, later to become a businessman, followed in 1905, and in 1908 Joaquín was born (on 5 September) in Berlin, where his father had moved to try to further his career. In 1909 Nin tried – and failed – to launch a national opera in Cuba and then retreated with his family to sulk in the outskirts of Brussels. Three years later the immature and exploitative Nin despatched wife and children to his parents in Barcelona and moved to Paris, abandoning his family to pursue his abusive peccadillos in the French capital.

JOAQUÍN MARIA NIN-CULMELL
Symphonie des Mystères

Catalogue No: TOCC 0011
EAN: 5 060113 440112

Sacred Music Series

Nin-Culmell – Malling – Sviridov
Hardouin – Telemann – Portugal
van Wilder – C.P.E. Bach



Discovery Club

Massive Savings
on CDs and Downloads
with FREE stuff
to welcome you on board

[JOIN HERE](#)

NOTE: the only satisfactory PDF viewer for attachments and annotations is [Adobe Reader](#).

Another example of an annotated iTunes digital booklet PDF with text and image links is Hyperion's [free, download-only, 'monthly sampler'](#) album.

Of course interactive PDF generation is useful for other purposes, notably sales and marketing, e.g. release sheets; digital bundles; free samples. It can save hours of manual word processing.

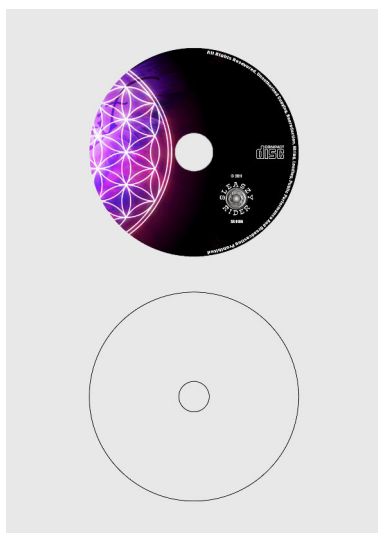
EPUB documents offer fixed and reflowable layouts optimised for the display device. EPUB is much easier to script than PDF, and data-driven EPUBs can be similarly generated.

3.3.4 Rear inlays

CD inlay PDFs can be similarly converted to linearized PDFs or flattened images, with or without the 6.5mm turn-ups, in the automation workflow.

3.3.5 Burn your own

For those who burn their own CDs, jewel case cover and inlay artwork, complete with crop and fold marks, can be automatically laid out on standard printer paper by the automation workflow. The page shown right is an example. Care must be taken to ensure the PDF is printed at 100% size to fit the jewel case correctly.



Similarly, circular disc labels can be generated as PDF files. A simple web form could allow the user to position the download image for printing on self-adhesive CD label paper. The page shown left conforms to the widely available EU30029 A4 label template.

Digital booklet PDFs can also be provided for easy home printing. Here is an example where a jewel case booklet is laid out as two-page spreads for A4 size double-sided printing, producing a physical A5 size booklet. It includes guide marks along the centre for saddle binding with a long reach stapler. This can be done for US Letter size (ANSI A) too without shrinking, producing Half Letter booklets.



All the above could be generated on the server for download as an A4 or US Letter sized PDF, in colour or grayscale, customised via a web form. With the downloaded music, this would provide a complete CD-from-FLAC solution for low cost DIY CD production.

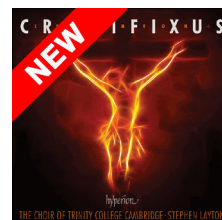
3.4 Images

3.4.1 Cover art

Artwork for prepress is in the CMYK colour space. Converting to RGB or Grayscale for the web is done in the workflow, as is uploading via FTP. Conversion is done using embedded ICC profile data for best colour matching. Grayscale album covers are effective for asides and adverts. I also developed server-side software for generating cached thumbnails on demand.



'Digital cover' images can be created, e.g. to show digital product links, by drawing an overlay on the image. The thumbnail generator can do this as a post process (for a crisper image), and custom overlays are easy to add. The example on the left shows an icon for a shopping cart item marked as a FLAC digital download. The cover on the right is marked as a new release. With dynamic imaging, the NEW annotation would disappear automatically in, say, a months time.



3.4.2 Image maps

The montages of jewel cased CDs below are generated automatically from cover art and titles. First, a jewel case is simulated around the cover. The hinge colour is the quantization median of the colours contained in the cover. The title is drawn into that hinge space in a contrasting colour. The image is then rotated and a shadow effect added. Multiple covers are overlaid, at an offset.

The resulting composite image looks quite realistic: a spread of cased CDs that took milliseconds to create.

The angles can be uniform...



...or haphazard...



...and of course many layouts are possible.

An image map is a markup element that adds links and titles to areas of an image. The English Songbook image above gives the idea but on a web page all the CD shapes would link to their respective album pages. An associated image map is generated as the montage is built.

3.5 Website

3.5.1 Automation

We don't want to be changing the website whenever a new album is released. Automatic web page generation is needed so that album detail pages spawn automatically and get linked in from other pages without manual intervention. Catalogue, composer, performer and release pages should also update automatically.

That is achieved by making website content data-driven, and using server techniques to provide meaningful URLs which redirect to dynamic content.

3.5.2 Data-driven

The server must deliver data suitably structured for client-side presentation. Whether the markup is hard coded or uses a template engine like Smarty, the business side and middleware are distinct, often developed by different people, with a clear API.

Database views are a flexible and convenient way to implement API models for data-driven web content.

 ◀ ▶ John Turner credit: Teresa Dietrich	John Turner recorder	
Albums	• Spratley: Music for String Orchestra • Joubert: Song-Cycles, Chamber Music	
Works	• Joubert, J.: Improvisation, Op. 120, for recorder and piano ▶ • Spratley, P.: Recorder Concertino, A Gallery of Cats, Op. 26 ▶ • Joubert, J.: The Hour Hand, Op. 101, for soprano and recorder ▶ • Joubert, J.: The Rose is Shaken in the Wind, Op. 137, for soprano and recorder ▶	
Vocalists	• Lesley-Jane Rogers, soprano	
Other Instrumentalists	• John McCabe, piano	
Ensembles	• Manchester Sinfonia, orchestra	
Conductors	• Philip Spratley, conductor	
Composers	• John Joubert, composer • Philip Spratley, composer	

The image above illustrates the level of granularity I developed, taken from a typical website album page. It shows that for this label, John Turner features in the given albums, playing alongside the listed performers in works by the composers shown. Soprano Lesley-Jane Rogers is shown because the mouse is over her name. All the links show hover images. They link to album, performer or composer pages. So clicking on John McCabe (who sadly died last month) will take you to a similar fragment. The play buttons take you to the work in the track list, then play the sample clip.

The image on the next page shows a typical data-driven tracklist, with track 7 *Daybreak* detail expanded, and track 15 *Elegy* playing (shows an animated spinning disc icon). Other tabs on the album detail page include Artists, Biographies, Reviews and Comments.

Track	Title	Duration	Listen	MP3
(1-32)	Robin Milford: Piano Music and Songs	78:18		7.99
(1-3)	▣ <i>My Lady's Pleasure</i> , for piano	6:16		£0.85
1	Pastorale	2:35	▶	£0.40
2	Gavotte	1:50	▶	£0.35
3	Jig	1:51	▶	£0.35
(4-5)	▣ <i>Four Hardy Songs</i> (Hardy)	4:35		£0.65
4	No. 2, 'The Colour'	2:10	▶	£0.35
5	No. 4, 'Tolerance'	2:25	▶	£0.35
6	▣ <i>Cradle Song</i> (Blake)	3:11	▶	£0.50
7	▣ <i>Daybreak</i> (Donne) Composed 1925 Robin Milford, composer Phillida Bannister, contralto Raphael Terroni, piano (first recording)	1:52	▶	£0.35
(8-13)	▣ <i>Reputation Square</i> , for piano	13:35		£1.85
8	Matthew's and Welch's	2:11	▶	£0.35
9	Reputation Square	2:17	▶	£0.35
10	George's, and the New Wells Hornpipe	1:36	▶	£0.35
11	Trim the French	2:37	▶	£0.40
12	Jack in his Trousers	1:38	▶	£0.35
13	Jupiter in the Clouds	3:16	▶	£0.50
(14-16)	▣ <i>Four Songs</i> (Bridges), Nos. 1, 2 and 4	8:56		£1.20
14	No. 1, 'So Sweet Love Seemed'	2:36	▶	£0.40
15	No. 2, 'Elegy'	3:56	🔥	£0.60
16	No. 4, 'Love on my Heart'	2:24	▶	£0.35
(17-18)	▣ <i>Four Seasonable Songs</i> , Nos. 2 and 4	2:52		£0.40
17	No. 2, 'Summer. Pleasure It Is' (Cornish)	0:49	▶	£0.35
18	No. 4, 'Winter. This Endris Night' (Anon)	2:03	▶	£0.35
(19-21)	▣ <i>Prelude, Air and Finale (on a well-known mordent)</i> , for piano	10:42		£1.45
19	Prelude	3:13	▶	£0.50
20	Air	3:28	▶	£0.55
21	Finale	4:01	▶	£0.60
(22-30)	▣ <i>Swan Songs</i>	21:30		£2.95
22	No. 1, 'Song of St Mary the Virgin (The Magnificat)'	4:08	▶	£0.65
23	No. 2, 'The Song of Simeon (The Nunc Dimittis)'	1:28	▶	£0.35
24	No. 3, 'Idleness' (Young)	1:40	▶	£0.35
25	No. 4, 'Christmas Day' (Young)	2:23	▶	£0.35
26	No. 5, 'In Cornwall' (Ridler)	2:32	▶	£0.40
27	No. 6, 'Expectans Expectavi' (Ridler)	1:43	▶	£0.35
28	No. 7, 'The Holy Tide' (Tennyson)	2:40	▶	£0.40
29	No. 8, 'The Glance' (Herbert)	2:25	▶	£0.35
30	No. 9, 'Sleep' (Williams)	2:31	▶	£0.40
31	▣ <i>Jenifer's Jingle</i> , for piano	3:05	▶	£0.45
(32)	▣ <i>Days and Moments</i>	1:44		£0.35
32	II. Autumn: No. 4, 'An Epitaph' (Walter de la Mare)	1:44	▶	£0.35

3.5.3 Caching

Fast delivery of complex web page content works by caching areas of markup on the server. It also helps to cache complex database queries. Dynamically generated images are best cached too.

Together with cron jobs, the software I developed includes tools to clear or regenerate temporary data, on demand and periodically.

3.5.4 General

Web forms are something of a speciality, no matter how complex. Examples include moderated testimonials and guest book comments, and administration utilities. I can also help with email automation (generation and parsing) and many other web development tasks.

I also have a good command of CSS and JavaScript rendering, and dynamic effects.

3.6 Sales

3.6.1 Automatic pricing

I developed pricing algorithms for album, work and track digital products and physical CDs with support for discount schemes. It is too involved to describe in detail but here's an overview...

Works are priced less than the sum of their constituent tracks (movements), and similar for albums. Prices depend on music duration, with a floor price exceeding the transaction fee charged by the payment processor. Computed prices can be overridden by database values based on unique stock keeping unit (SKU).

3.6.2 Discounts

The label I developed for had discount policies for subscription members, combo bundles and special offers, as well as combinations of those (reduced discounts). Discounts can be specified as a fixed amount or percentage.

It's good to give away samples too, and a freebie policy can be engineered in.

3.6.3 Payment processing

I am very familiar with PayPal IPN, Barclaycard ePDQ, Google Checkout, and other processors.

3.6.4 Validation

The workflow incorporates validation steps for checking the integrity of digital products. It checks for missing files and checksum mismatches.

Metadata validation scripts prevent tagging omissions.

3.6.5 Download Manager

MP3 albums and works are bundled into uncompressed ZIP files (nothing is gained by further compression). This applies to all lossy formats. I include Digital Booklets in the bundles for added value. ZIPs become too large for lossless bundles, so download automation is required.

Multiple file downloads can be achieved with client-side automated Ajax fetches and server-side secure delivery. jQuery plugins exist for simultaneous downloads. The HTML5 download attribute looks promising long term, but is not yet well supported.

Multiple file direct download links (DDL) are not possible in emails; email scripting support is not widespread because of virus abuse. DDLs need to point to other protocols.

Installed download managers are another option. Hyperion's runs on the Adobe AIR platform with a Flash interface, as a desktop app. The advantage is background downloading into a defined file structure. The disadvantage is having to install it – punters buy from many different labels.

Third party sales and cloud storage is another option, keeping hosting costs low. Exciting developments from Google for digital asset management look highly promising.

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