P@NOPTIC

A panoptic view of Databases, XML and IR

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Panoptic - Seeing the whole at one view.

Sheffield, 29 Jul 2004

Starting Points

Background

- Goal (1998): Turn PADRE into an Enterprise Search product
- Develop an efficient, practical model of Text + Metadata/Structure
- `es.csiro.au/pubs/hawking_tr00b.pdf`
- Implement other components, "productize"

Panoptic

- 23 July 1999 - First site
- 23 July 2004 - 34 commercial sites, incl. 1 Canadian, 1 UK
- Databases – email – continuous media – events

Lessons learned

- The customer is always right BUT no two customers are the same!
- The publisher, NOT the searcher, is the customer.
- Content doesn't cut it
- TRUE and FALSE are enough

An example from an oil exploration company

Drilling information recorded in many forms

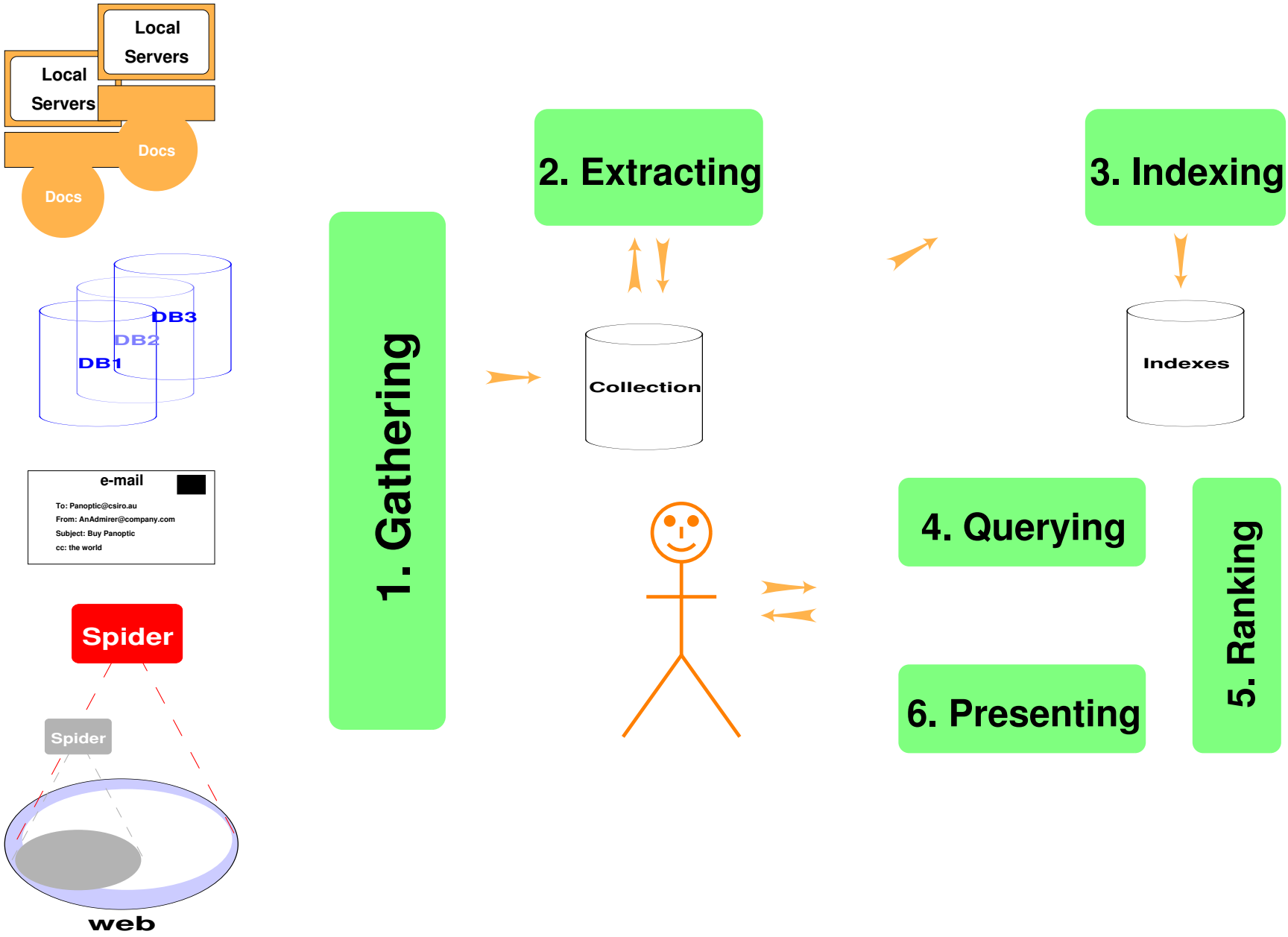
- email
- word processing documents
- spreadsheets
- database records
- OCR-ed faxes

Inconsistent vocabulary

- e.g. "stuck pipe" represented in many ways

Results are wells, not documents

Result display is tabular - links to GENESIS application


Local Servers
Local Servers
Docs
Docs
DB3
DB2
DB1
e-mail
To: Panoptic@csiro.au
From: AnAdmirer@company.com
Subject: Buy Panoptic
cc: the world
Spider
Spider
web
1. Gathering
2. Extracting
Collection
3. Indexing
Indexes
4. Querying
5. Ranking
6. Presenting

Key Issues

1. Handling heterogeneity
2. Answer value v. answer relevance
3. Index the database or webpages derived from it?
4. Answer extent
5. Searching for services
6. Boundary between IR & DB

1. Handling Heterogeneity

"Metadata" classes

Example query element: "author=Baeza-Yates"

- (23,700 Google results for Baeza-Yates)
- author information represented in many different ways:
  - `<meta name=author content="Arjen de Vries">`
  - `dc.creator`, `dc.contributor`, `dc.author`, ...
  - `From: mounia@cs.qmul.ac.uk (Mounia Lalmas)`
  - `/article/fm/au`
  - `AUTH` field in database
  - perhaps external to document

Panoptic maps author, title, publisher, language etc to metadata classes, represented by single letters. i.e. `a:Baeza-Yates`

Raises the lowest common denominator for search over combination of webpages, email archives, XML collections, databases. `Find Baeza-Yates in /article/fm/au` is no good in this context.

Heterogeneous Gathering

Crawl web pages

- extraction programs for storing metadata from non-HTML
- crawl XML
- external metadata tagging based on URL prefixes

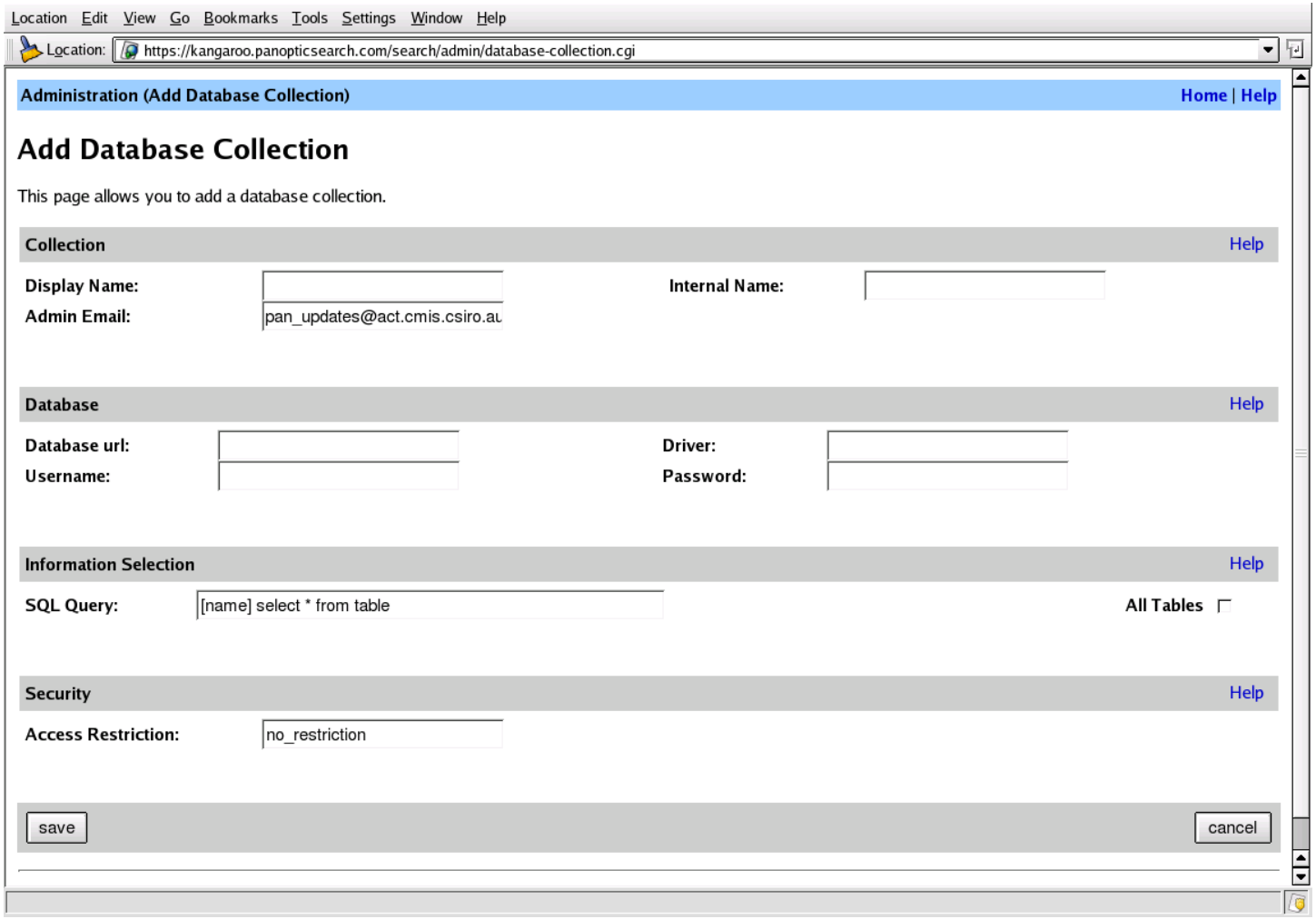
Use db2xml plus JDBC bridge to convert DB records to XML files

- SQL query defines the records/fields to be indexed [sals] select * from employees e, salaries s where e.employeeid = s.employeeid
- sals becomes element name – can map to metadata classes
- See `www.panopticsearch.com/AdminHelp/database.html`

Filecopying – with text and metadata extraction

Email – scanners for different mail formats

Administration of Database Indexing



Panoptic query elements

Words, phrases, wildcards

- `Workshop on databases and IR`
- `"to be or not to be"`
- `David.Hawking@csiro.au`
- `"data* and *formation ret*"`

Metadata elements

- `a:maarek p:ibm d>feb`
- `a:*aa*`

Query operators

Boolean is too difficult for many

- `cat AND dog` - find me documents with `cat` and documents with `dog`!
- default to AND (with fallback), use brackets for alternatives
- `[a:Rölleke a:Roelleke]` - dysjunction group

negation: `!`

mandatory exclusion: `-`

mandatory inclusion: `+`

- `+u:ibm.il [a:Maarek a:Sofer] xml databases !"technical report"`

Constraint Counting and Result Tiers

Each query element (dysjunction group is a single element) represents a constraint.

- `+u:ibm.il [a:maarek a:sofer] xml databases !"technical report"`
  - five constraints - one mandatory

Primary results sort is number of constraints matched.

Results are presented in tiers:

- fully matching documents
- documents matching n-1 constraints out of n

Fully matching tier represents AND – all tiers constitute OR

Dropped both MAYBE state and constraint ordering:

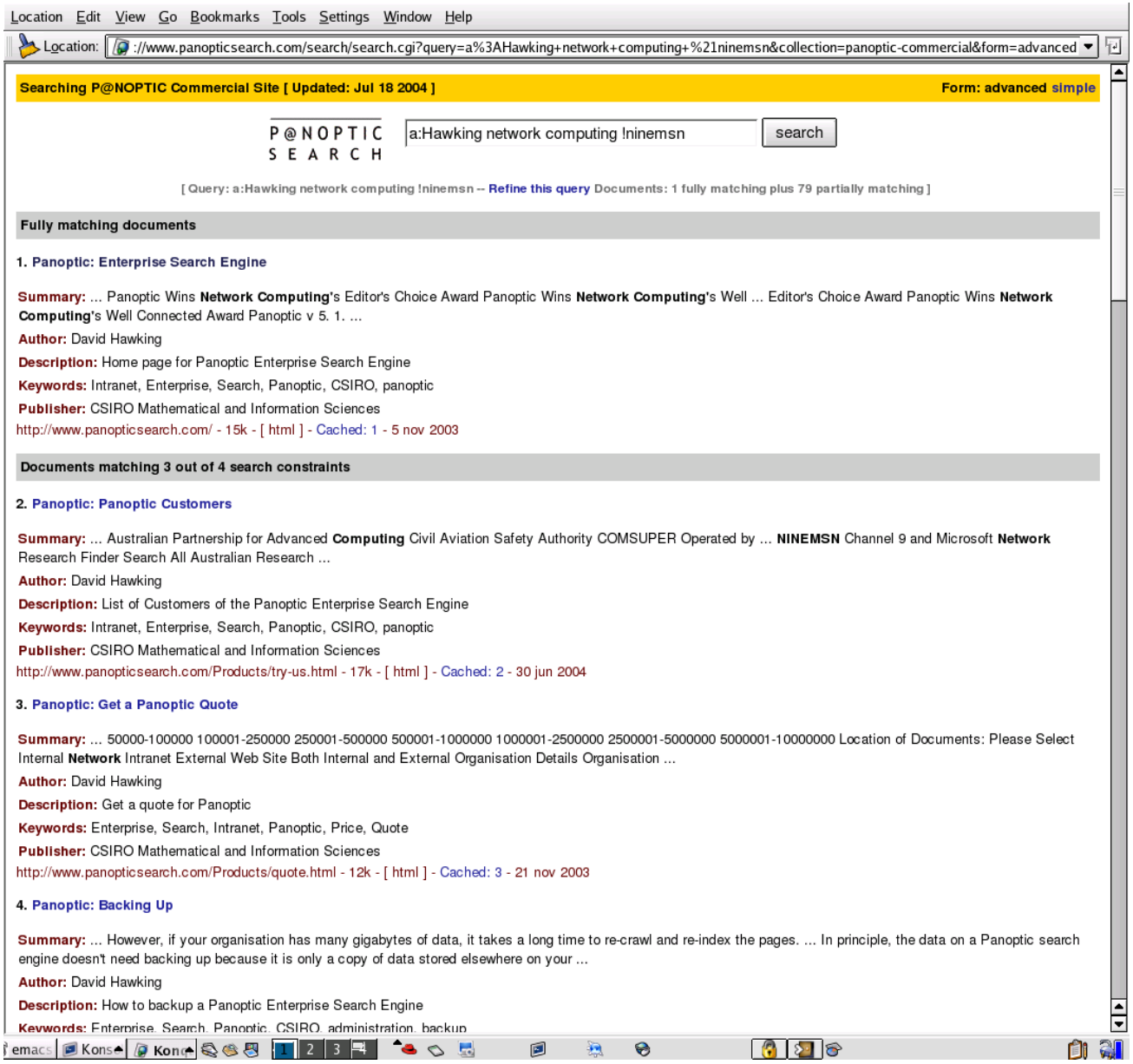
- Sub-tiers caused confusion
- MAYBE almost always equivalent to FALSE

Added scoping operators:– mandatory in/exclusion with no constraint.

As deployed at NRC

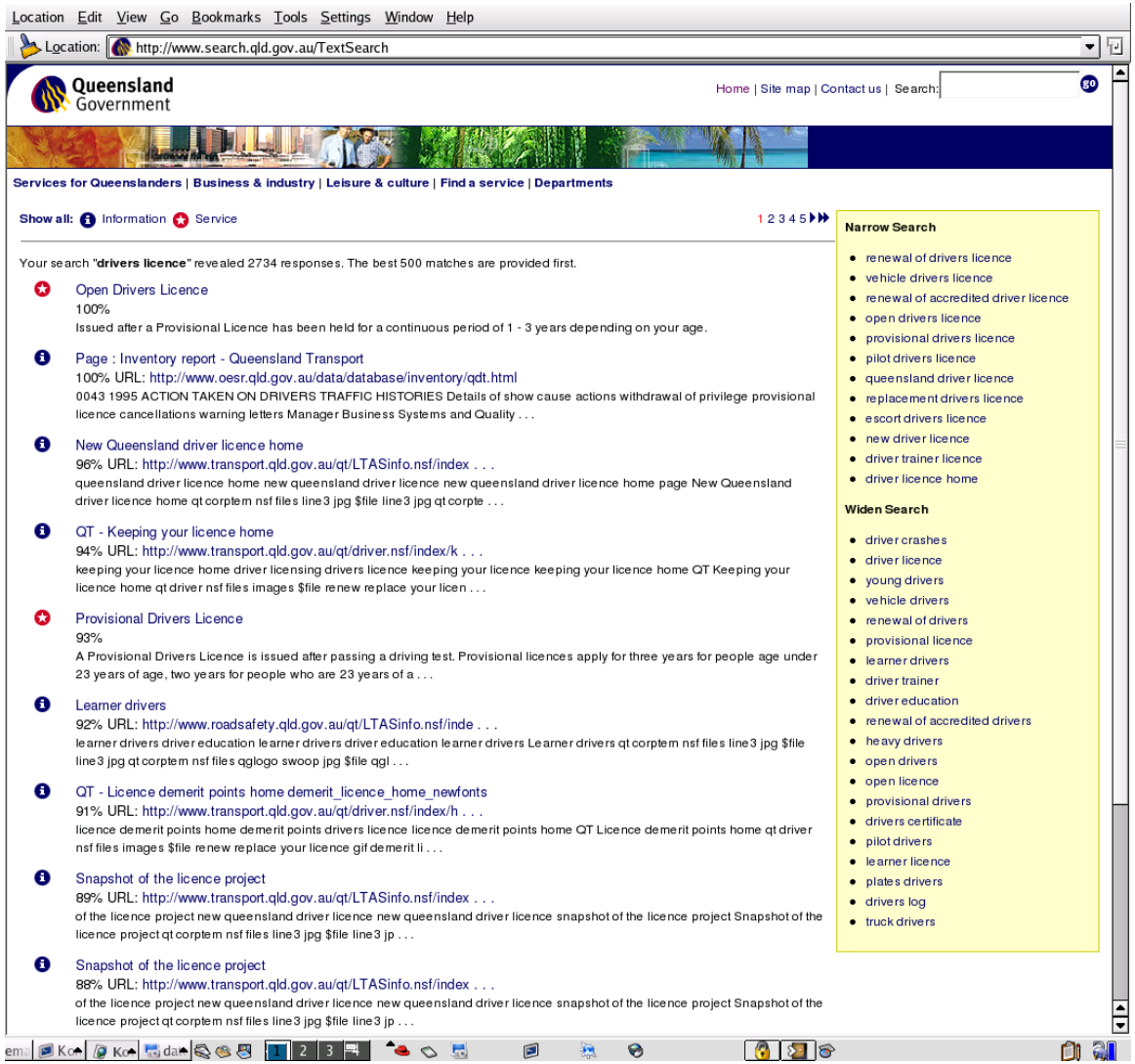
Most people use very simple queries or a form.

Result presentation in tiers



A distributed approach

Search a database and the web pages, then merge results



Thoughts (on heterogeneity)

Started with an IR engine

– Could start with a database engine

Usually deploy in "centralised" mode

– all data in a single index or meta-index
– distributed is a possible alternative

Are some types of result better than others?

– e.g Web pages better than database records?

Structural mapping OK - what about vocabulary mapping?

– Thesaurus
– Metadata-aware thesaurus?
  * baker, smith, ...

2. Value v. Relevance

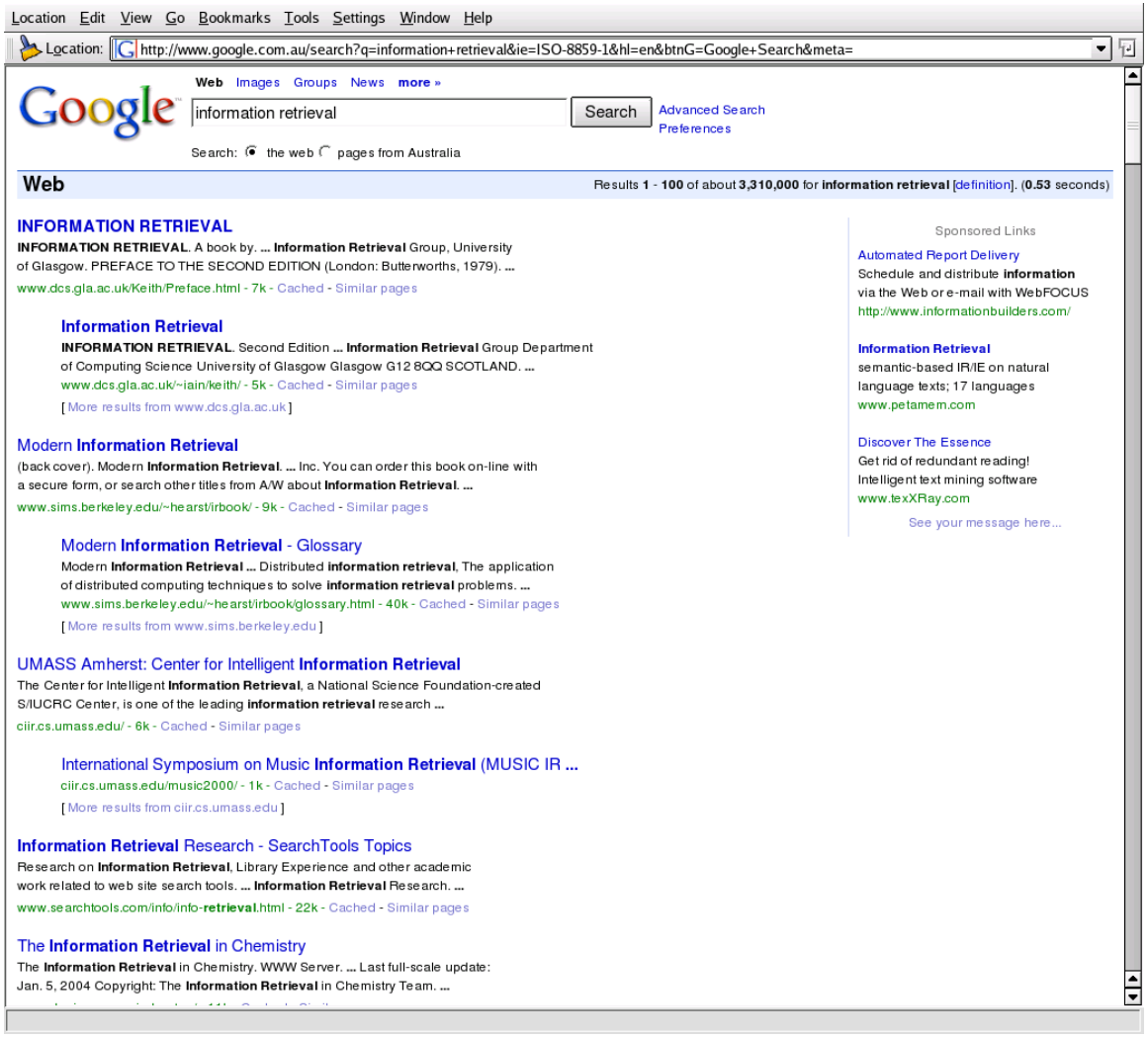
A lesson from Web Search

Web searchers want valuable resources, not individual relevant documents

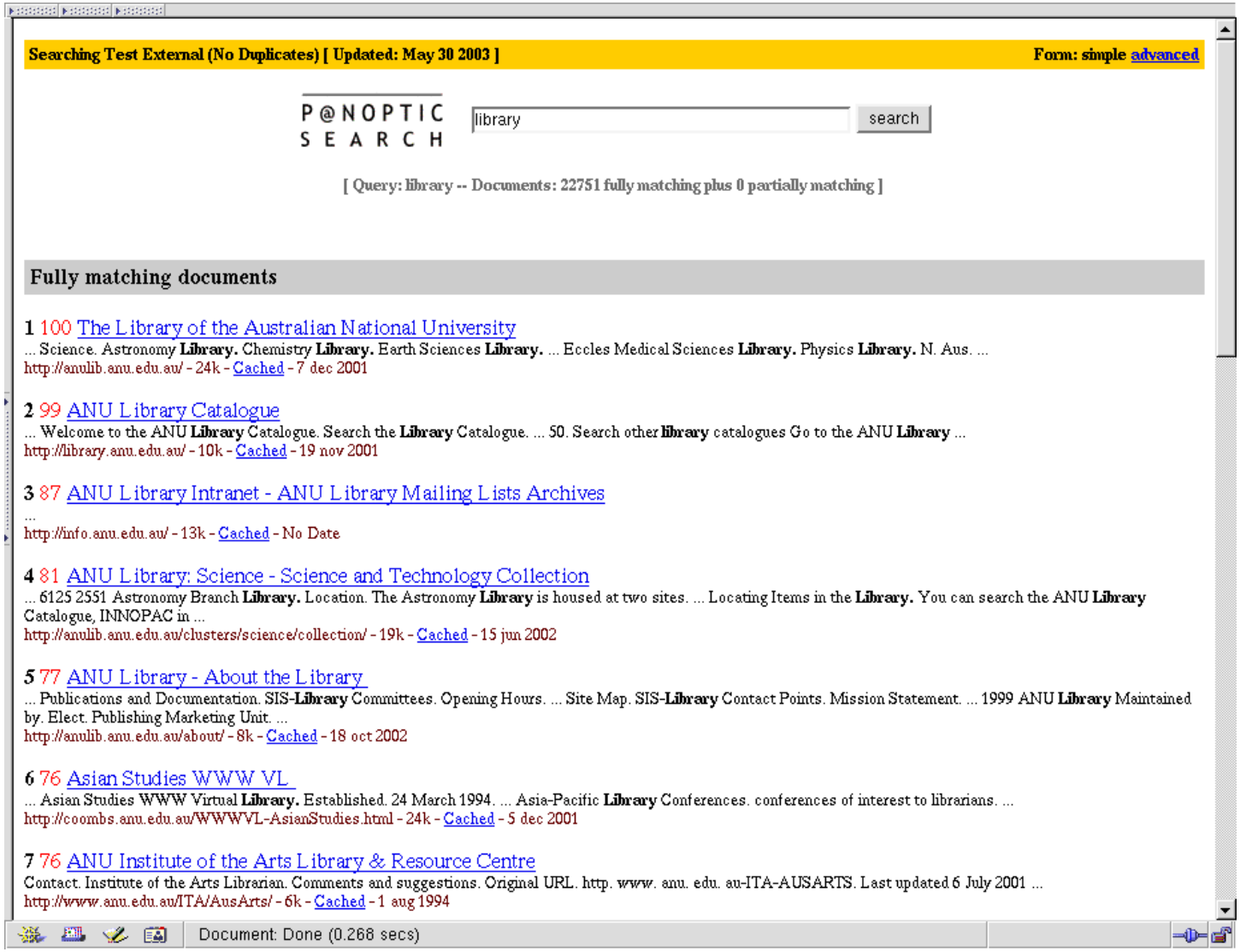
– NASA homepage rather than thousands of individual NASA documents

In webs you can tell what the valuable resources are from anchor text, links and URL structure.

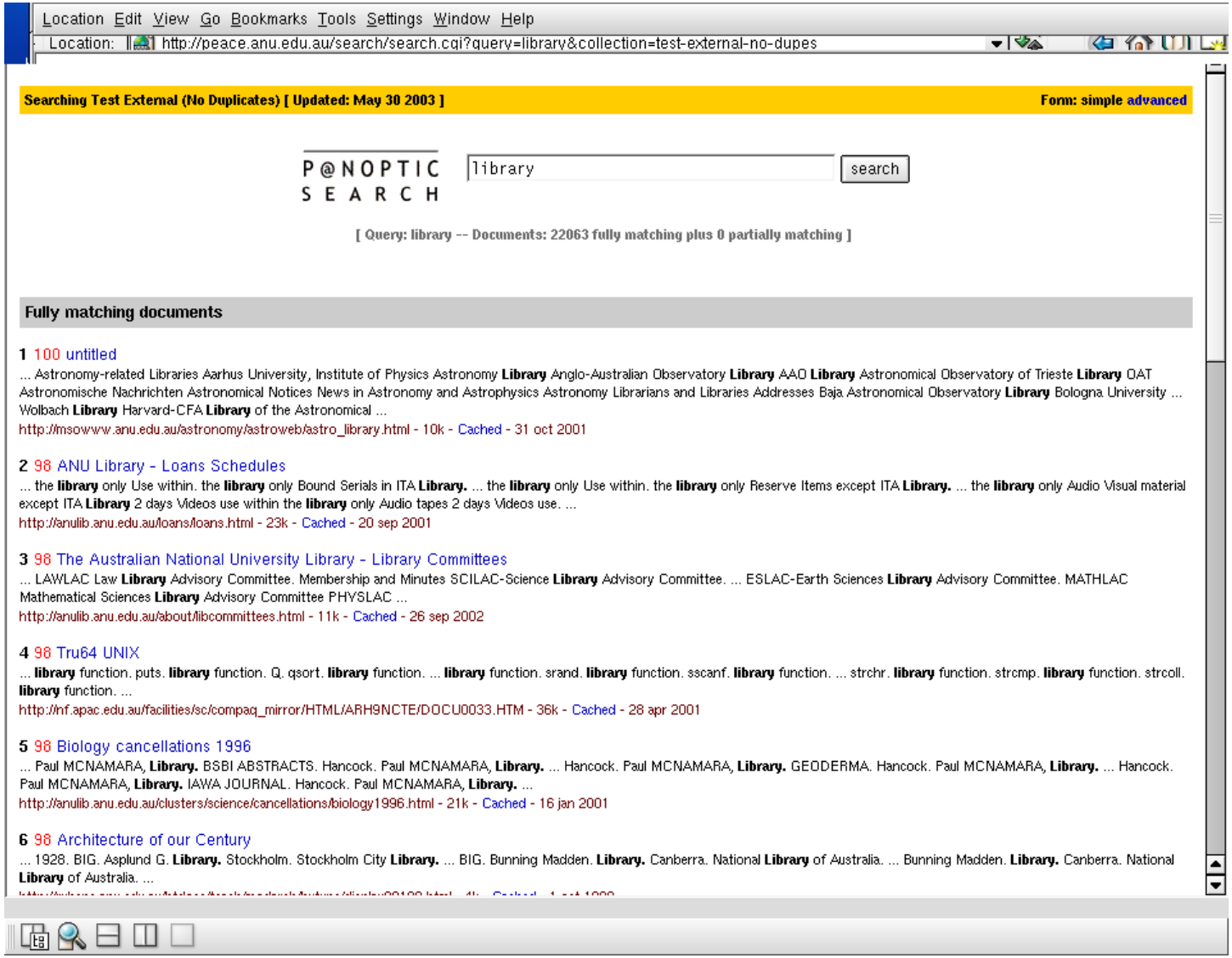
Example 1


Location Edit View Go Bookmarks Tools Settings Window Help
Location: http://www.google.com.au/search?q=information+retrieval&ie=ISO-8859-1&hl=en&btnG=Google+Search&meta=
Google
Web Images Groups News more »
information retrieval
Search
Advanced Search
Preferences
Search: the web pages from Australia
Web
Results 1 - 100 of about 3,310,000 for information retrieval [definition]. (0.53 seconds)
INFORMATION RETRIEVAL
INFORMATION RETRIEVAL. A book by. ... Information Retrieval Group, University of Glasgow. PREFACE TO THE SECOND EDITION (London: Butterworths, 1979). ...
www.dcs.gla.ac.uk/Keith/Preface.html - 7k - Cached - Similar pages
Information Retrieval
INFORMATION RETRIEVAL. Second Edition ... Information Retrieval Group Department of Computing Science University of Glasgow Glasgow G12 8QQ SCOTLAND. ...
www.dcs.gla.ac.uk/~iain/keith/ - 5k - Cached - Similar pages
[More results from www.dcs.gla.ac.uk]
Modern Information Retrieval
(back cover). Modern Information Retrieval. ... Inc. You can order this book on-line with a secure form, or search other titles from A/W about Information Retrieval. ...
www.sims.berkeley.edu/~hearst/irbook/ - 9k - Cached - Similar pages
Modern Information Retrieval - Glossary
Modern Information Retrieval ... Distributed information retrieval, The application of distributed computing techniques to solve information retrieval problems. ...
www.sims.berkeley.edu/~hearst/irbook/glossary.html - 40k - Cached - Similar pages
[More results from www.sims.berkeley.edu]
UMASS Amherst: Center for Intelligent Information Retrieval
The Center for Intelligent Information Retrieval, a National Science Foundation-created S/IUCRC Center, is one of the leading information retrieval research ...
ciir.cs.umass.edu/ - 6k - Cached - Similar pages
International Symposium on Music Information Retrieval (MUSIC IR ...
ciir.cs.umass.edu/music2000/ - 1k - Cached - Similar pages
[More results from ciir.cs.umass.edu]
Information Retrieval Research - SearchTools Topics
Research on Information Retrieval, Library Experience and other academic work related to web site search tools. ... Information Retrieval Research. ...
www.searchtools.com/info/info-retrieval.html - 22k - Cached - Similar pages
The Information Retrieval in Chemistry
The Information Retrieval in Chemistry. WWW Server. ... Last full-scale update: Jan. 5, 2004 Copyright: The Information Retrieval in Chemistry Team. ...
Sponsored Links
Automated Report Delivery
Schedule and distribute information via the Web or e-mail with WebFOCUS
http://www.informationbuilders.com/
Information Retrieval
semantic-based IR/IE on natural language texts; 17 languages
www.petamem.com
Discover The Essence
Get rid of redundant reading! Intelligent text mining software
www.texXRay.com
See your message here...

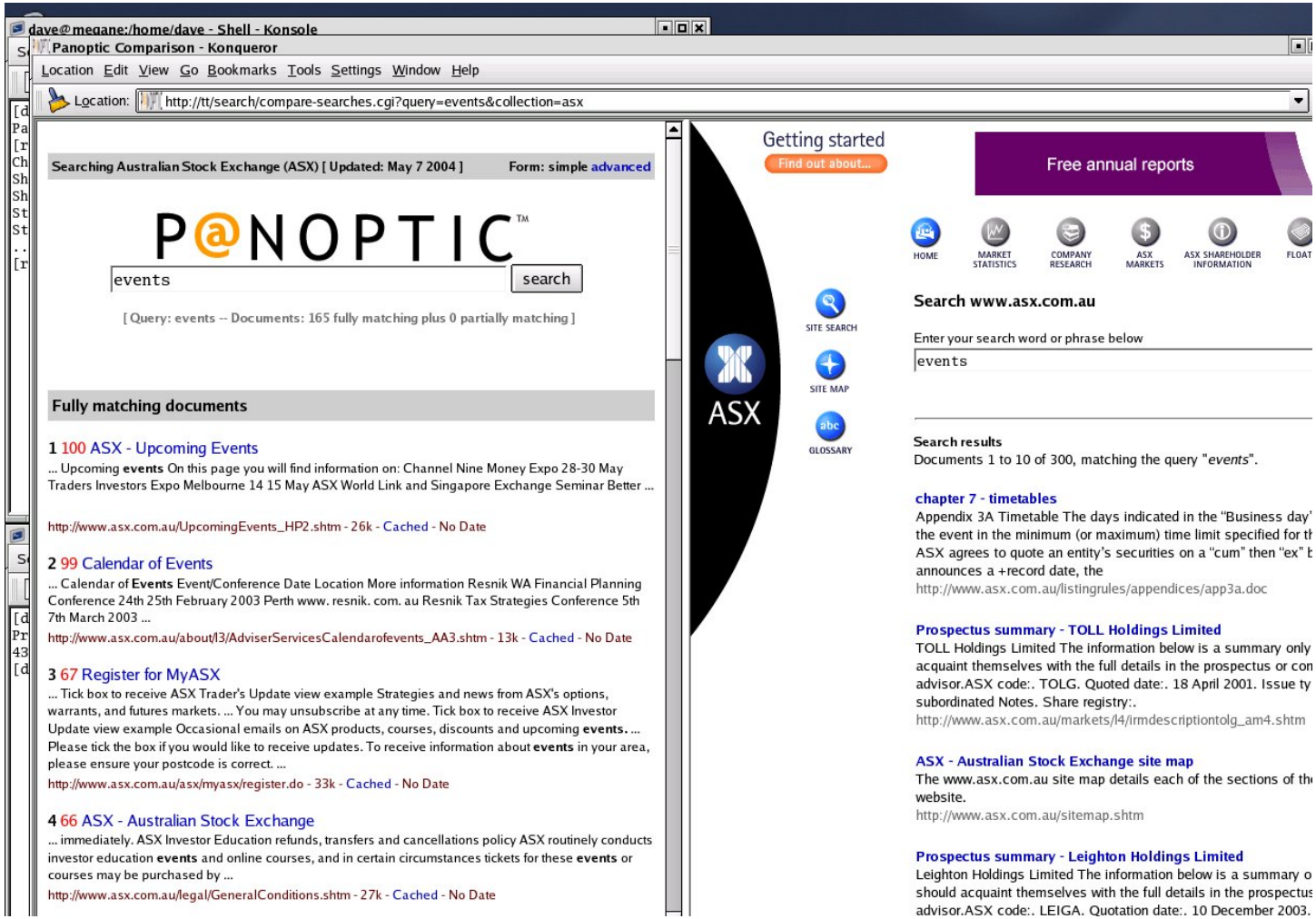
Example 2a


Searching Test External (No Duplicates) [Updated: May 30 2003]
Form: simple advanced
P@NOPTIC SEARCH
library
search
[Query: library -- Documents: 22751 fully matching plus 0 partially matching]
Fully matching documents
1 100 The Library of the Australian National University
... Science. Astronomy Library. Chemistry Library. Earth Sciences Library. ... Eccles Medical Sciences Library. Physics Library. N. Aus. ...
http://anulib.anu.edu.au/ - 24k - Cached - 7 dec 2001
2 99 ANU Library Catalogue
... Welcome to the ANU Library Catalogue. Search the Library Catalogue. ... 50. Search other library catalogues Go to the ANU Library ...
http://library.anu.edu.au/ - 10k - Cached - 19 nov 2001
3 87 ANU Library Intranet - ANU Library Mailing Lists Archives
...
http://info.anu.edu.au/ - 13k - Cached - No Date
4 81 ANU Library: Science - Science and Technology Collection
... 6125 2551 Astronomy Branch Library. Location. The Astronomy Library is housed at two sites. ... Locating Items in the Library. You can search the ANU Library Catalogue, INNOPAC in ...
http://anulib.anu.edu.au/clusters/science/collection/ - 19k - Cached - 15 jun 2002
5 77 ANU Library - About the Library
... Publications and Documentation. SIS-Library Committees. Opening Hours. ... Site Map. SIS-Library Contact Points. Mission Statement. ... 1999 ANU Library Maintained by. Elect. Publishing Marketing Unit. ...
http://anulib.anu.edu.au/about/ - 8k - Cached - 18 oct 2002
6 76 Asian Studies WWW VL
... Asian Studies WWW Virtual Library. Established. 24 March 1994. ... Asia-Pacific Library Conferences. conferences of interest to librarians. ...
http://coombs.anu.edu.au/WWWVL-AsianStudies.html - 24k - Cached - 5 dec 2001
7 76 ANU Institute of the Arts Library & Resource Centre
Contact. Institute of the Arts Librarian. Comments and suggestions. Original URL. http. www. anu. edu. au-ITA-AUSARTS. Last updated 6 July 2001 ...
http://www.anu.edu.au/ITA/AusArts/ - 6k - Cached - 1 aug 1994
Document: Done (0.268 secs)

Example 2b


Location Edit View Go Bookmarks Tools Settings Window Help
Location: http://peace.anu.edu.au/search/search.cgi?query=library&collection=test-external-no-dupes
Searching Test External (No Duplicates) [Updated: May 30 2003]
Form: simple advanced
P@NOPTIC SEARCH
library
search
[Query: library -- Documents: 22063 fully matching plus 0 partially matching]
Fully matching documents
1 100 untitled
... Astronomy-related Libraries Aarhus University, Institute of Physics Astronomy Library Anglo-Australian Observatory Library AAO Library Astronomical Observatory of Trieste Library OAT Astronomische Nachrichten Astronomical Notices News in Astronomy and Astrophysics Astronomy Librarians and Libraries Addresses Baja Astronomical Observatory Library Bologna University ... Wolbach Library Harvard-CFA Library of the Astronomical ...
http://msowww.anu.edu.au/astronomy/astroweb/astro_library.html - 10k - Cached - 31 oct 2001
2 98 ANU Library - Loans Schedules
... the library only Use within. the library only Bound Serials in ITA Library. ... the library only Use within. the library only Reserve Items except ITA Library. ... the library only Audio Visual material except ITA Library 2 days Videos use within the library only Audio tapes 2 days Videos use. ...
http://anulib.anu.edu.au/loans/loans.html - 23k - Cached - 20 sep 2001
3 98 The Australian National University Library - Library Committees
... LAWLAC Law Library Advisory Committee. Membership and Minutes SCILAC-Science Library Advisory Committee. ... ESLAC-Earth Sciences Library Advisory Committee. MATHLAC Mathematical Sciences Library Advisory Committee PHYSLAC ...
http://anulib.anu.edu.au/about/libcommittees.html - 11k - Cached - 26 sep 2002
4 98 Tru64 UNIX
... library function. puts. library function. Q. qsort. library function. ... library function. srand. library function. sscanf. library function. ... strchr. library function. strcmp. library function. strcoll. library function. ...
http://nf.apac.edu.au/facilities/sc/compaq_mirror/HTML/ARH9NCTE/DOCU0033.HTM - 36k - Cached - 28 apr 2001
5 98 Biology cancellations 1996
... Paul MCNAMARA, Library. BSBI ABSTRACTS. Hancock. Paul MCNAMARA, Library. ... Hancock. Paul MCNAMARA, Library. GEODERMA. Hancock. Paul MCNAMARA, Library. ... Hancock. Paul MCNAMARA, Library. IAWA JOURNAL. Hancock. Paul MCNAMARA, Library. ...
http://anulib.anu.edu.au/clusters/science/cancellations/biology1996.html - 21k - Cached - 16 jan 2001
6 98 Architecture of our Century
... 1928. BIG. Asplund G. Library. Stockholm. Stockholm City Library. ... BIG. Bunning Madden. Library. Canberra. National Library of Australia. ... Bunning Madden. Library. Canberra. National Library of Australia. ...

Example 3


dave@megane:/home/dave - Shell - Konsole
Panoptic Comparison - Konqueror
Location Edit View Go Bookmarks Tools Settings Window Help
Location: http://tt/search/compare-searches.cgi?query=events&collection=asx
Searching Australian Stock Exchange (ASX) [Updated: May 7 2004]
Form: simple advanced
P@NOPTIC™
events
search
[Query: events -- Documents: 165 fully matching plus 0 partially matching]
Fully matching documents
1 100 ASX - Upcoming Events
... Upcoming events On this page you will find information on: Channel Nine Money Expo 28-30 May Traders Investors Expo Melbourne 14 15 May ASX World Link and Singapore Exchange Seminar Better ...
http://www.asx.com.au/UpcomingEvents_HP2.shtm - 26k - Cached - No Date
2 99 Calendar of Events
... Calendar of Events Event/Conference Date Location More information Resnik WA Financial Planning Conference 24th 25th February 2003 Perth www. resnik. com. au Resnik Tax Strategies Conference 5th 7th March 2003 ...
http://www.asx.com.au/about/l3/AdviserServicesCalendarofevents_AA3.shtm - 13k - Cached - No Date
3 67 Register for MyASX
... Tick box to receive ASX Trader's Update view example Strategies and news from ASX's options, warrants, and futures markets. ... You may unsubscribe at any time. Tick box to receive ASX Investor Update view example Occasional emails on ASX products, courses, discounts and upcoming events. ... Please tick the box if you would like to receive updates. To receive information about events in your area, please ensure your postcode is correct. ...
http://www.asx.com.au/asx/myasx/register.do - 33k - Cached - No Date
4 66 ASX - Australian Stock Exchange
... immediately. ASX Investor Education refunds, transfers and cancellations policy ASX routinely conducts investor education events and online courses, and in certain circumstances tickets for these events or courses may be purchased by ...
http://www.asx.com.au/legal/GeneralConditions.shtm - 27k - Cached - No Date
ASX
SITE SEARCH
SITE MAP
GLOSSARY
Getting started
Find out about...
Free annual reports
HOME
MARKET STATISTICS
COMPANY RESEARCH
ASX MARKETS
ASX SHAREHOLDER INFORMATION
Search www.asx.com.au
Enter your search word or phrase below
events
Search results
Documents 1 to 10 of 300, matching the query "events".
chapter 7 - timetables
Appendix 3A Timetable The days indicated in the "Business day" the event in the minimum (or maximum) time limit specified for th ASX agrees to quote an entity's securities on a "cum" then "ex" b announces a +record date, the
http://www.asx.com.au/listingrules/appendices/app3a.doc
Prospectus summary - TOLL Holdings Limited
TOLL Holdings Limited The information below is a summary only acquaint themselves with the full details in the prospectus or con advisor.ASX code:. TOLG. Quoted date:. 18 April 2001. Issue ty subordinated Notes. Share registry:.
http://www.asx.com.au/markets/l4/irmdescriptiontolg_am4.shtm
ASX - Australian Stock Exchange site map
The www.asx.com.au site map details each of the sections of th website.
http://www.asx.com.au/sitemap.shtm
Prospectus summary - Leighton Holdings Limited
Leighton Holdings Limited The information below is a summary o should acquaint themselves with the full details in the prospectus advisor.ASX code:. LEIGA. Quotation date:. 10 December 2003.

A challenge for DB/XML retrieval

How do you get the Web search win in collections of XML documents or in a database, or in email?

- Exploiting references - do they mean the same as on the web?
- Is there an equivalent of search and browse?
- How to suppress repetition?
  - Google suppresses results more than two results from the same site
  - Panoptic implements an increasing boredom factor.

3. Index web pages OR the DB records from which they were generated?

Searching the DB

can you map DB records to useful URLs?

just display the content of the record?

xsltproc (e.g. with Genesis links)

how do you include database results among web pages?

how do you rank DB records relative to web pages?

some customers store HTML or XML in their DB records.

– SE mustn't trash it, but it can trash results page.

Searching generated Web pages

possible multiple duplication/repetition

do links automatically generated from DB records mean anything?

will external people link to automatically generated pages?

– depends upon URLs

4. Answer Extent

Parallel between web search and INEX 'exhaustivity' / 'specificity'

XML blurs the definition of "document"

– So does hypertext

Keith van R's IR book is a good example.

A relevant website is a better result than a web page

– right level, can avoid repetition
– browse
– local search

Visual blocks within web pages.

5. Searching for services

Currently many people search the web for services

- buy a ticket to Sheffield
- download MP3 of Waltzing Matilda
- renew my staff card

What will be the effect of SOAP/ Web Services

- Does it work in a heterogeneous environment
- Exploiting links, anchortext etc.

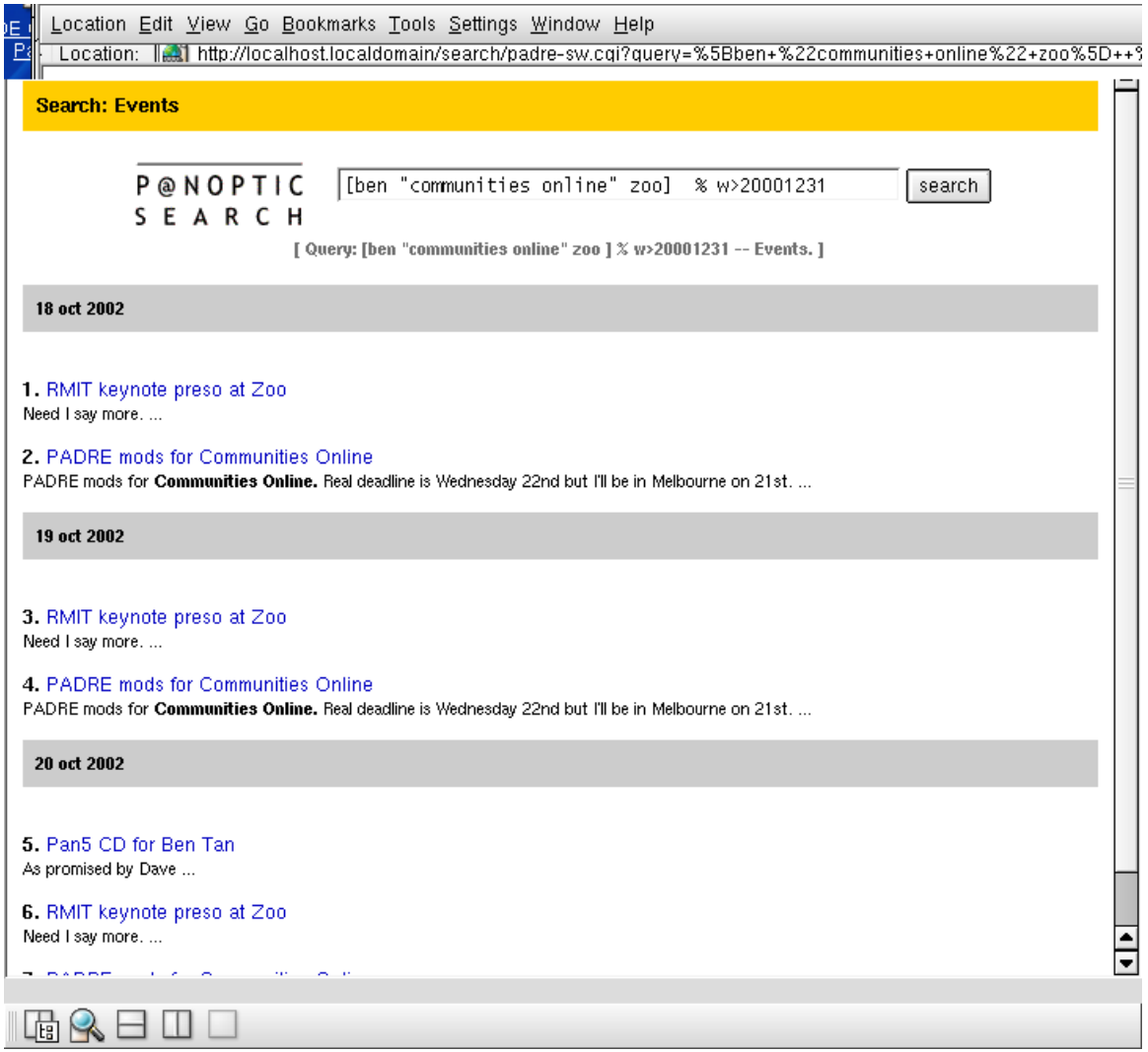
6. Boundary between IR & DB

How far should an IR system go?

– Joins, set computations
– Are databases really a special case of IR systems?

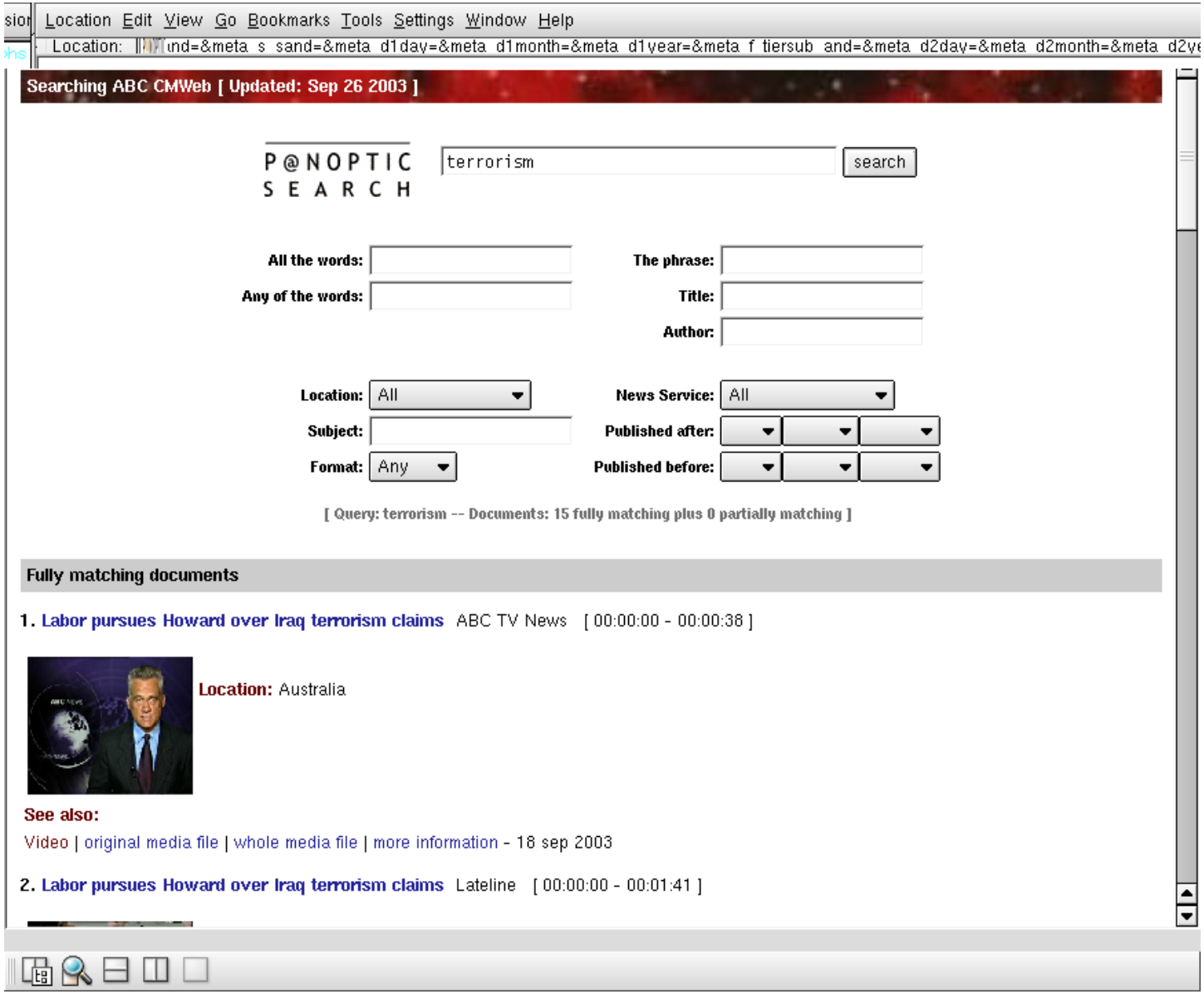
7. Some Applications

Event Search prototype


Location Edit View Go Bookmarks Tools Settings Window Help
Location: http://localhost.localdomain/search/padre-sw.cgi?query=%5Bben+%22communities+online%22+zoo%5D++%
Search: Events
P@NOPTIC SEARCH
[ben "communities online" zoo] % w>20001231
search
[Query: [ben "communities online" zoo] % w>20001231 -- Events.]
18 oct 2002
1. RMIT keynote preso at Zoo
Need I say more. ...
2. PADRE mods for Communities Online
PADRE mods for Communities Online. Real deadline is Wednesday 22nd but I'll be in Melbourne on 21st. ...
19 oct 2002
3. RMIT keynote preso at Zoo
Need I say more. ...
4. PADRE mods for Communities Online
PADRE mods for Communities Online. Real deadline is Wednesday 22nd but I'll be in Melbourne on 21st. ...
20 oct 2002
5. Pan5 CD for Ben Tan
As promised by Dave ...
6. RMIT keynote preso at Zoo
Need I say more. ...

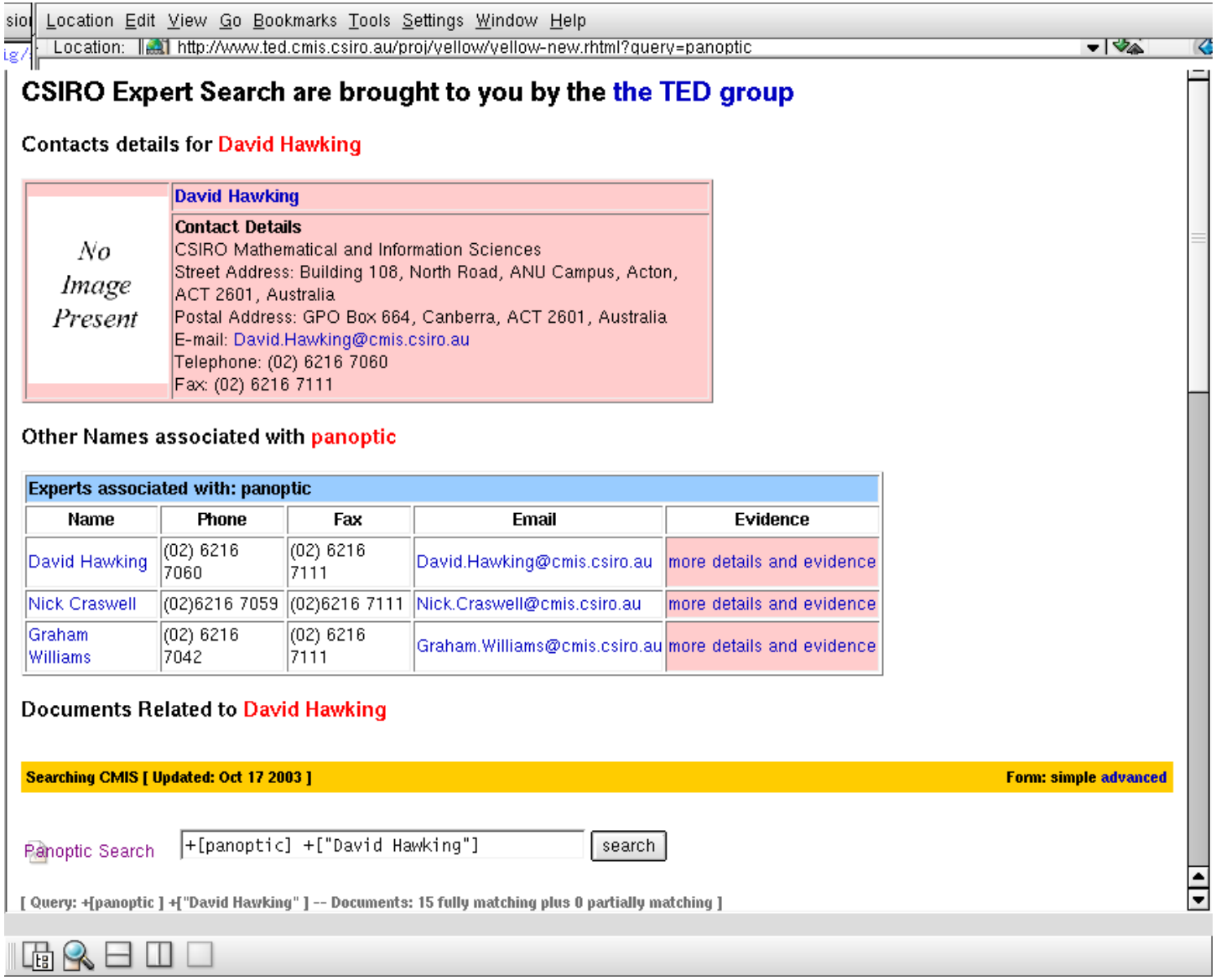
CMWeb Search prototype

Slide 2


Location Edit View Go Bookmarks Tools Settings Window Help
Location:
Searching ABC CMWeb [Updated: Sep 26 2003]
P@NOPTIC SEARCH
terrorism
search
All the words:
Any of the words:
The phrase:
Title:
Author:
Location: All
News Service: All
Subject:
Published after:
Format: Any
Published before:
[Query: terrorism -- Documents: 15 fully matching plus 0 partially matching]
Fully matching documents
1. Labor pursues Howard over Iraq terrorism claims ABC TV News [00:00:00 - 00:00:38]
Location: Australia
See also:
Video | original media file | whole media file | more information - 18 sep 2003
2. Labor pursues Howard over Iraq terrorism claims Lateline [00:00:00 - 00:01:41]

People Finder prototype

Slide 4


Location Edit View Go Bookmarks Tools Settings Window Help
Location: http://www.ted.cmis.csiro.au/proj/yellow/yellow-new.rhtml?query=panoptic
CSIRO Expert Search are brought to you by the the TED group
Contacts details for David Hawking
No Image Present
David Hawking
Contact Details
CSIRO Mathematical and Information Sciences
Street Address: Building 108, North Road, ANU Campus, Acton, ACT 2601, Australia
Postal Address: GPO Box 664, Canberra, ACT 2601, Australia
E-mail: David.Hawking@cmis.csiro.au
Telephone: (02) 6216 7060
Fax: (02) 6216 7111
Other Names associated with panoptic
Experts associated with: panoptic
Name | Phone | Fax | Email | Evidence
David Hawking | (02) 6216 7060 | (02) 6216 7111 | David.Hawking@cmis.csiro.au | more details and evidence
Nick Craswell | (02)6216 7059 | (02)6216 7111 | Nick.Craswell@cmis.csiro.au | more details and evidence
Graham Williams | (02) 6216 7042 | (02) 6216 7111 | Graham.Williams@cmis.csiro.au | more details and evidence
Documents Related to David Hawking
Searching CMIS [Updated: Oct 17 2003]
Form: simple advanced
Panoptic Search
+[panoptic] +["David Hawking"]
search
[Query: +[panoptic] +["David Hawking"] -- Documents: 15 fully matching plus 0 partially matching]

Recap of Key Issues

1. Handling heterogeneity
2. Answer value v. answer relevance
3. Index the database or webpages derived from it?
4. Answer extent
5. Searching for services
6. Boundary between IR & DB

Where to from here?

What the world needs now ...

Is a heterogeneous enterprise search collection with real queries

- intranet pages
- website pages
- databases
- email
- fileshares
- XML

Possiblities

- W3C collection
  - public web and email (real queries)
- A bankrupt company
  - Enron? but what queries?

David.Hawking@acm.org

es.csiro.au – thylacine.panopticsearch.com/dave/irdbxml.pdf