Knowledge warehousing with WebKB-2

A knowledge server for structuring, sharing and publishing information

Dr Philippe MARTIN

philippe.martin@gu.edu.au

DSTC

The on-line slides are accessible at http://www.webkb.org/doc/slides/dstc0302.html

Plan

- Documents, databases, knowledge bases
- Data/knowledge warehouses
- The advantages of WebKB-2
- Examples with generated interfaces
- Examples with a tailored interface
- More examples of knowledge representation/sharing

Documents, databases, knowledge bases

- The semantic content of documents cannot be extracted automatically
- Lexical techniques (e.g. keyword-based techniques) do not support question answering ($\rightarrow$ precision/recall ratio, redundancies, no structure/inference)
- Data indexation and retrieval in databases and structured documents must follow *predefined* schemas
- Knowledge bases (KBs) permit to store and interconnect logical representations of facts, rules or definitions according to dynamically updatable hierarchy of concepts and relations (ontologies), and thus may support knowledge sharing, comparison and retrieval via conceptual browsing or querying

But knowledge representation is a difficult manual task that is not much facilitated by current knowledge base systems/servers.

Data/knowledge warehouses

Merging data from distributed databases require specially-designed wrappers (+ middlewares such as CORBA) and may be inefficient. In such a case, data warehousing is the solution.

Correctly merging knowledge representations from independently developped KBs is much more difficult, even manually.
Genuine knowledge sharing implies knowledge warehousing.

The advantages of WebKB-2

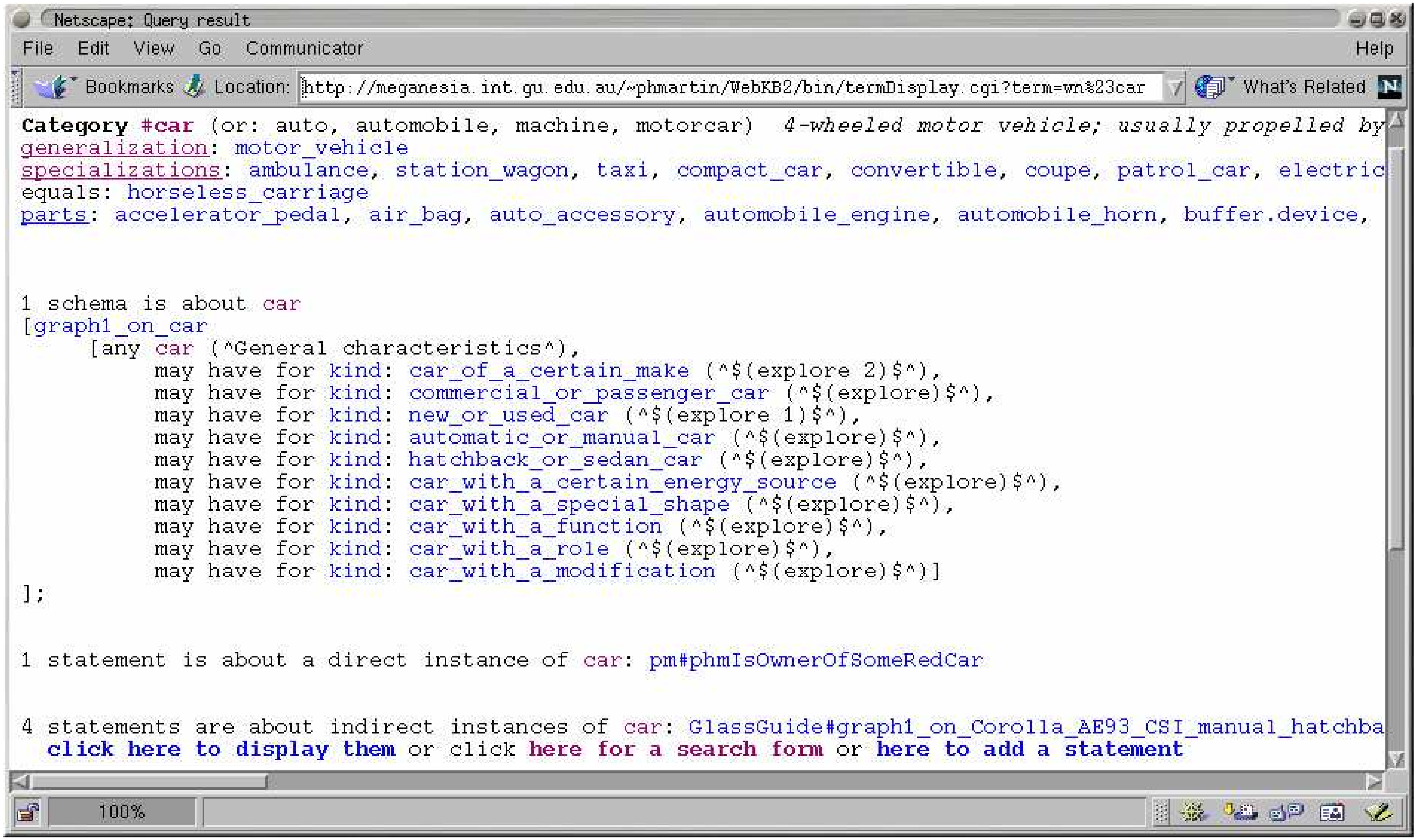
- Can be used by Web users/agents (www.webkb.org)
- Supports very large KBs
- Initialized with the biggest general KB after CYC
- Exploits the KB to generate forms for guiding and easing knowledge entering
- Has intuitive expressive and high-level input/output formats
- Permits users to update a shared KB without lexical/semantic conflicts nor redundancies, *and* without obliging the users to agree with each other.

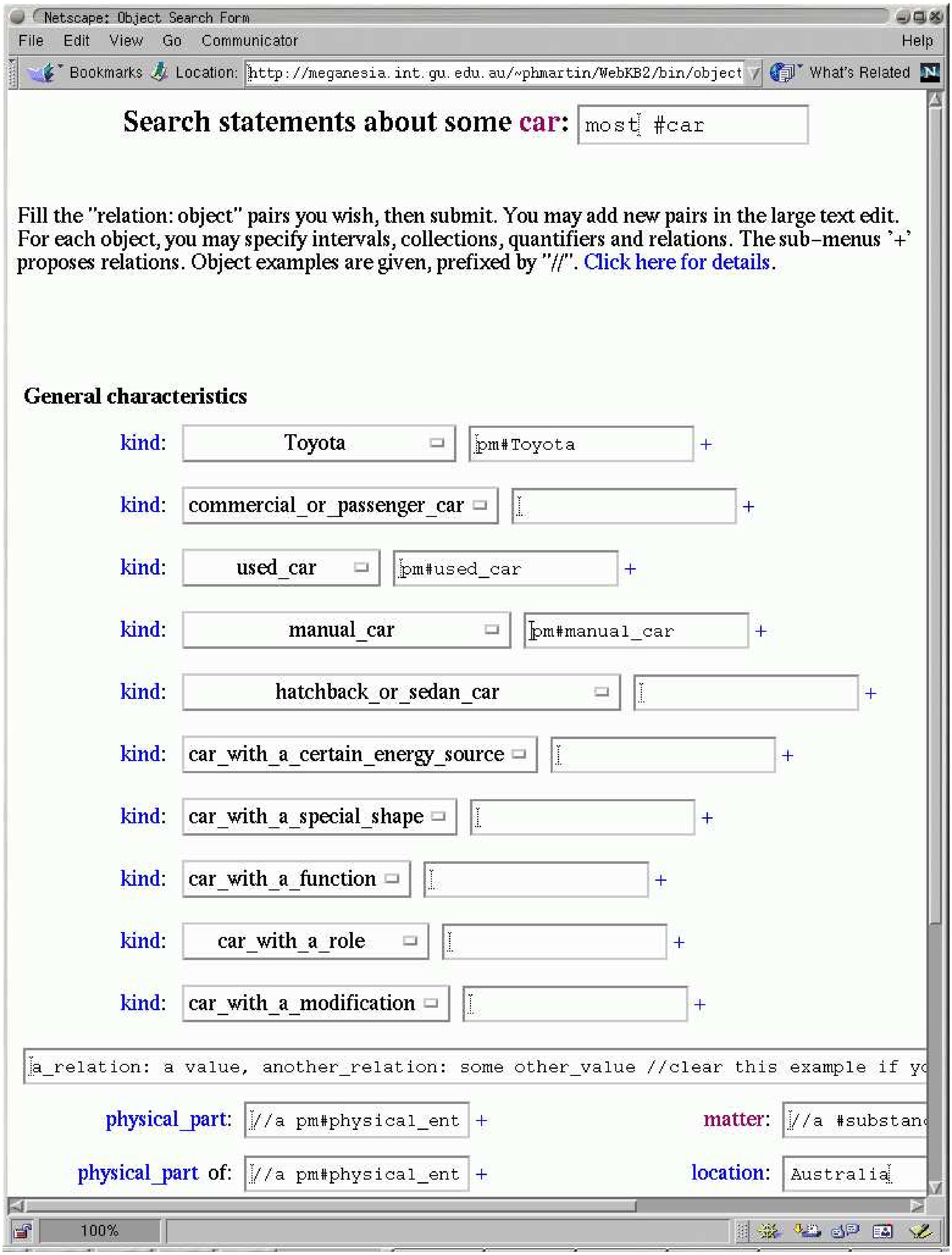
Applications:

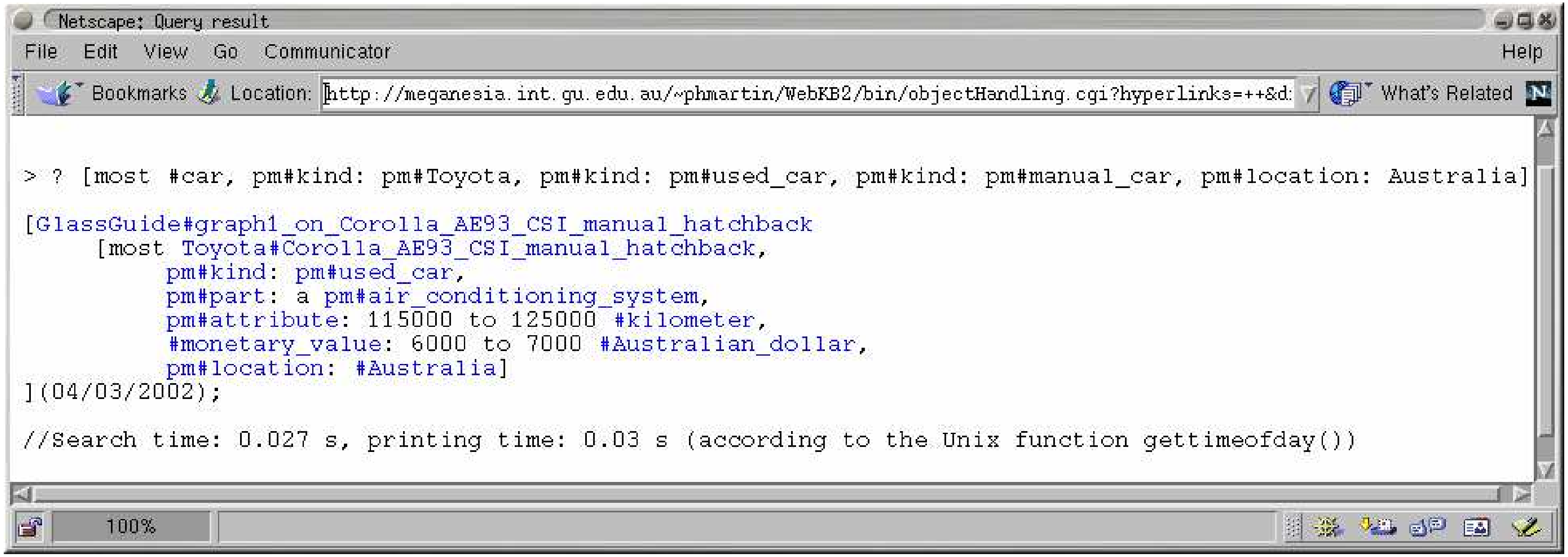
- Yellow-Pages, Auctions, Classifieds, Shopping, Jobs, Personals, ...
- Corporate memories, cooperative ontology building, state of the art

Examples with generated interfaces

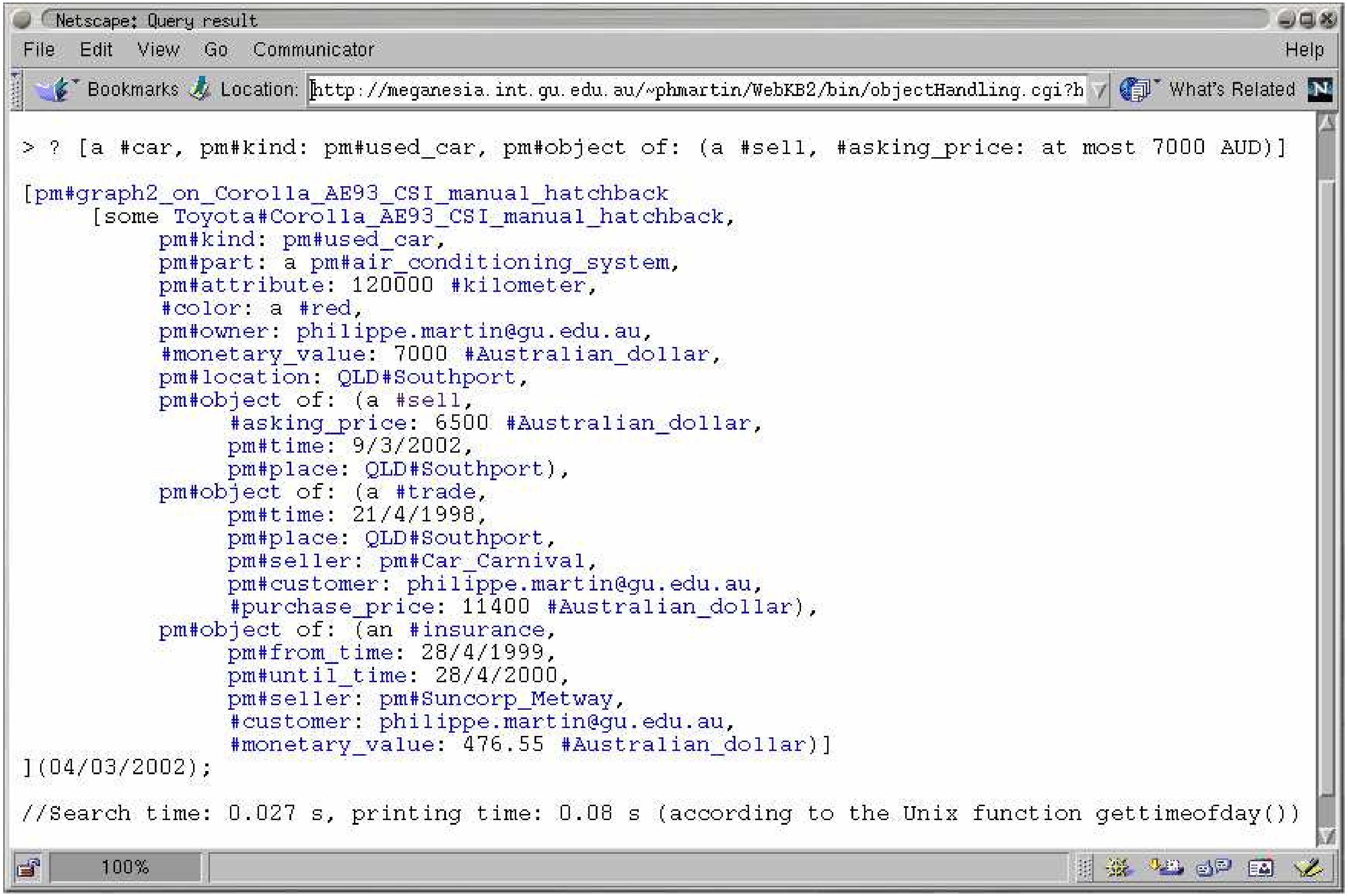
- Looking for the price of used Toyota Corolla manual cars in Australia
- Looking for used cars for sell in Southport for at most 7000 AUD
- Looking for new cars for sell by a car dealer


Netscape: Query result
File Edit View Go Communicator Help
Bookmarks Location: http://meganesia.int.gu.edu.au/~phmartin/WebKB2/bin/termDisplay.cgi?term=wn%23car
What's Related
Category #car (or: auto, automobile, machine, motorcar) 4-wheeled motor vehicle; usually propelled by
generalization: motor_vehicle
specializations: ambulance, station_wagon, taxi, compact_car, convertible, coupe, patrol_car, electric
equals: horseless_carriage
parts: accelerator_pedal, air_bag, auto_accessory, automobile_engine, automobile_horn, buffer.device,
1 schema is about car
[graph1_on_car
[any car (^General characteristics^),
may have for kind: car_of_a_certain_make (^$(explore 2)$^),
may have for kind: commercial_or_passenger_car (^$(explore)$^),
may have for kind: new_or_used_car (^$(explore 1)$^),
may have for kind: automatic_or_manual_car (^$(explore)$^),
may have for kind: hatchback_or_sedan_car (^$(explore)$^),
may have for kind: car_with_a_certain_energy_source (^$(explore)$^),
may have for kind: car_with_a_special_shape (^$(explore)$^),
may have for kind: car_with_a_function (^$(explore)$^),
may have for kind: car_with_a_role (^$(explore)$^),
may have for kind: car_with_a_modification (^$(explore)$^)]
];
1 statement is about a direct instance of car: pm#phmIsOwnerOfSomeRedCar
4 statements are about indirect instances of car: GlassGuide#graph1_on_Corolla_AE93_CSI_manual_hatchba
click here to display them or click here for a search form or here to add a statement
100%


Netscape: Object Search Form
File Edit View Go Communicator Help
Bookmarks Location: http://meganesia.int.gu.edu.au/~phmartin/WebKB2/bin/object
What's Related
Search statements about some car: most #car
Fill the "relation: object" pairs you wish, then submit. You may add new pairs in the large text edit. For each object, you may specify intervals, collections, quantifiers and relations. The sub-menus '+' proposes relations. Object examples are given, prefixed by "//". Click here for details.
General characteristics
kind: Toyota pm#Toyota +
kind: commercial_or_passenger_car +
kind: used_car pm#used_car +
kind: manual_car pm#manual_car +
kind: hatchback_or_sedan_car +
kind: car_with_a_certain_energy_source +
kind: car_with_a_special_shape +
kind: car_with_a_function +
kind: car_with_a_role +
kind: car_with_a_modification +
a_relation: a value, another_relation: some other_value //clear this example if yo
physical_part: //a pm#physical_ent +
matter: //a #substanc
physical_part of: //a pm#physical_ent +
location: Australia
100%



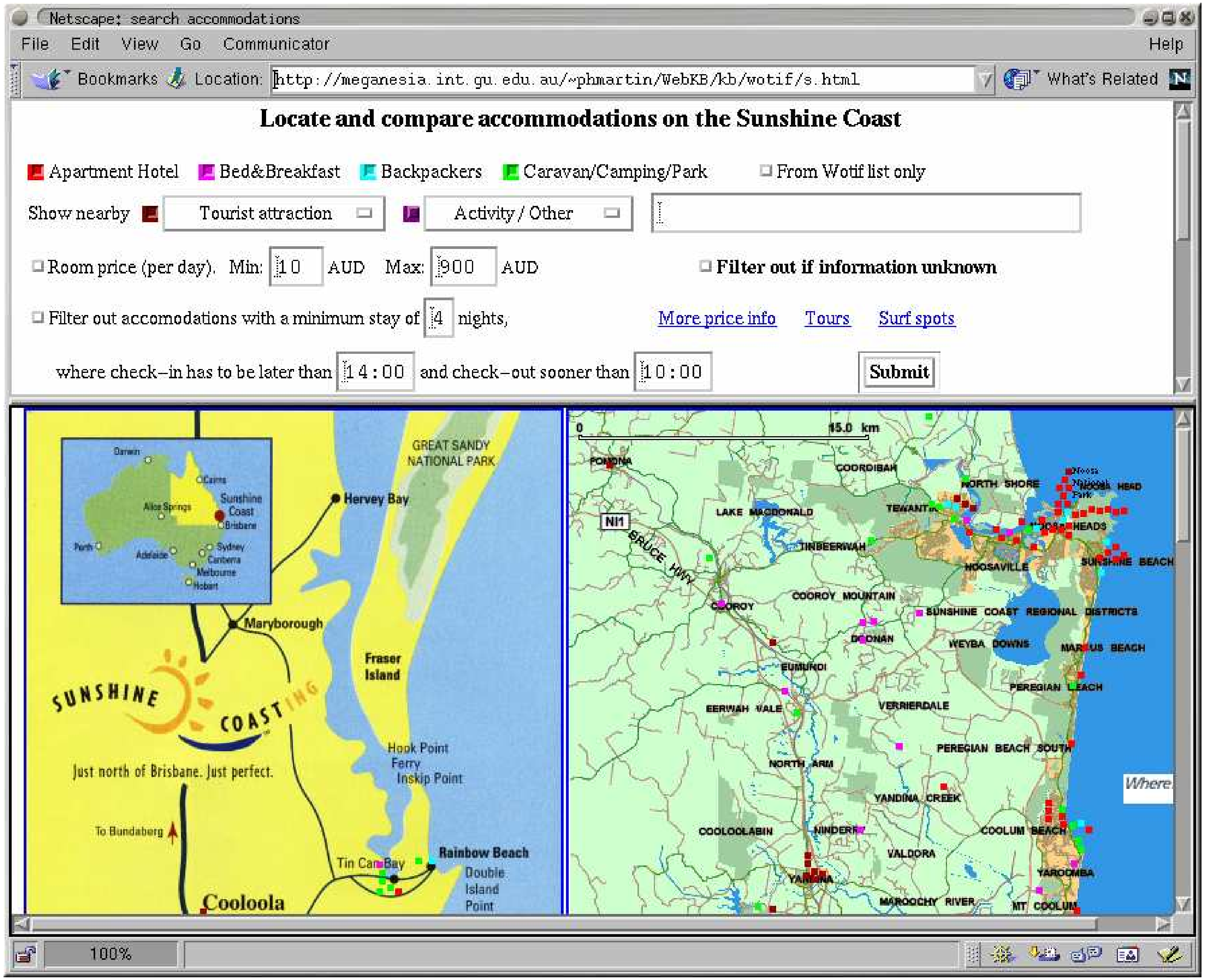
Searching information about most used Toyota Corolla manual cars in Australia.



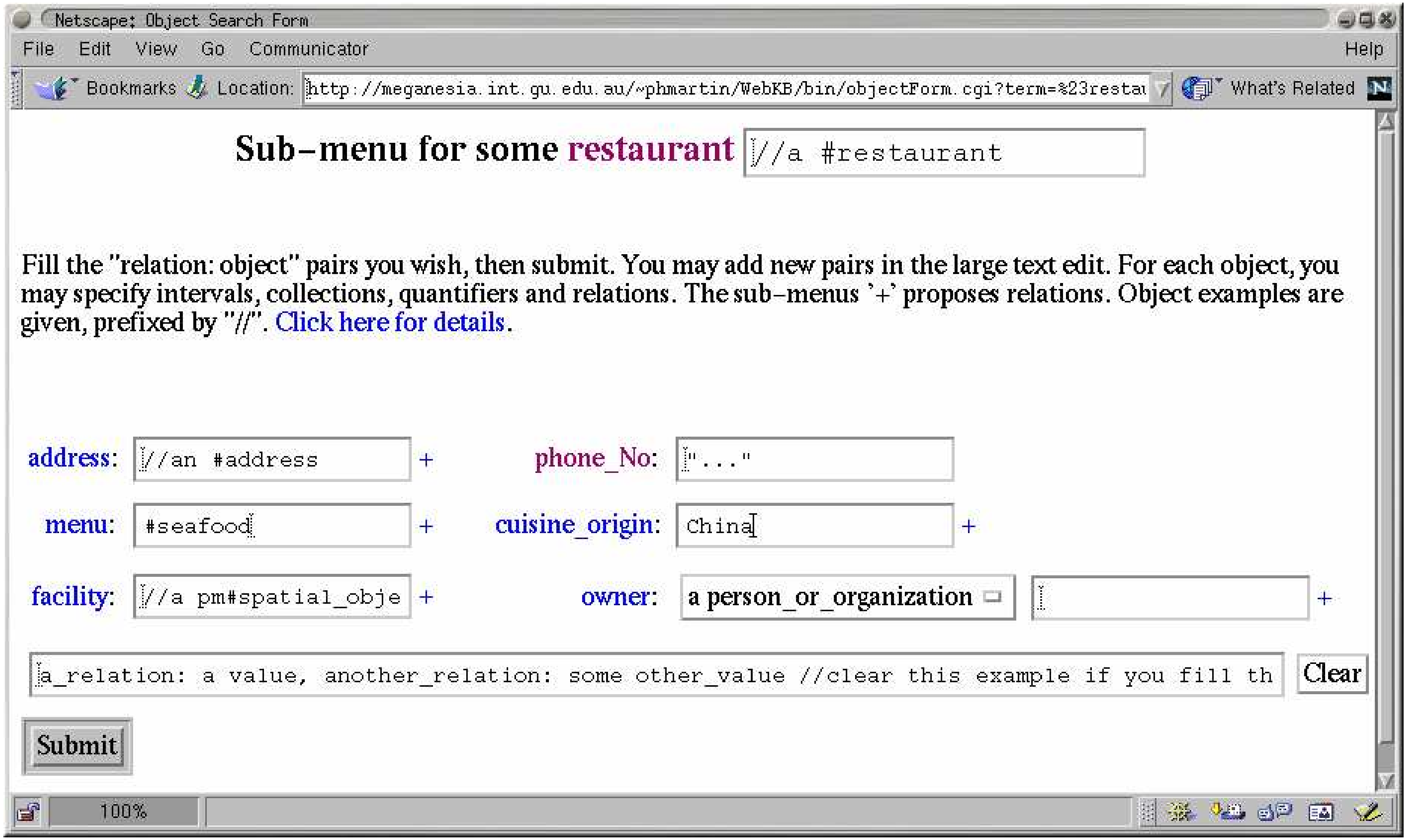
Searching information about used cars for sell in Southport for at most 7000 AUD.

Examples with a tailored interface

- Locating short-term accomodations and attractions on the Sunshine Coast
- Locating hotels or bed-and-breakfast charging less than 100 AUD a night, where check-out is no sooner than 11:00, without a minimum stay of 3 nights, near a Chineese restaurant
- Locating Eurasian restaurants near the selected accomodation
- Locating Chineese restaurants serving seafood



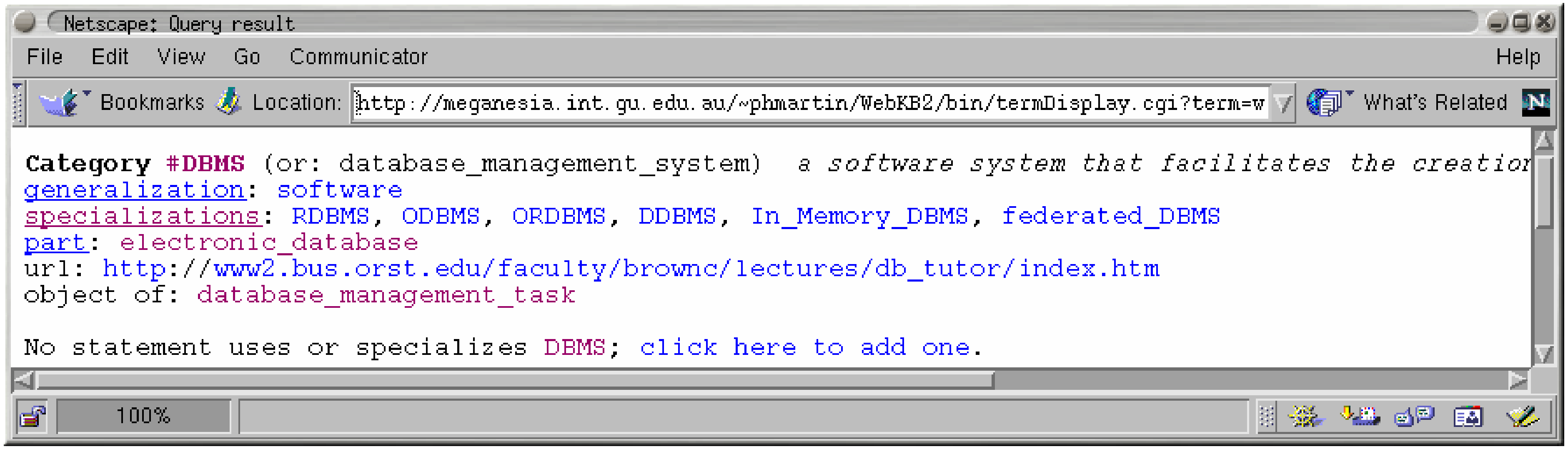
Netscape: search accommodations
File Edit View Go Communicator Help
Bookmarks Location: http://meganesia.int.gu.edu.au/~phmartin/WebKB/kb/wotif/s.html
What's Related
Locate and compare accommodations on the Sunshine Coast
Apartment Hotel
Bed&Breakfast
Backpackers
Caravan/Camping/Park
From Wotif list only
Show nearby
Tourist attraction
Activity / Other
Room price (per day). Min: 10 AUD Max: 900 AUD
Filter out if information unknown
Filter out accomodations with a minimum stay of 4 nights,
More price info
Tours
Surf spots
where check–in has to be later than 14:00 and check–out sooner than 10:00
Submit
GREAT SANDY NATIONAL PARK
Hervey Bay
Maryborough
Fraser Island
SUNSHINE COASTING
Just north of Brisbane. Just perfect.
Hook Point Ferry Inskip Point
To Bundaberg
Tin Can Bay
Rainbow Beach
Double Island Point
Cooloola
0 15.0 km
POMONA
COORDIBAH
NORTH SHORE
LAKE MACDONALD
TEWANTIN
NOOSA HEADS
TINBEERWAH
SUNSHINE BEACH
NOOSAVILLE
COOROY MOUNTAIN
COOROY
SUNSHINE COAST REGIONAL DISTRICTS
DOONAN
WEYBA DOWNS
MARCUS BEACH
EUMUNDI
PEREGIAN BEACH
EERWAH VALE
VERRIERDALE
PEREGIAN BEACH SOUTH
NORTH ARM
YANDINA CREEK
COOLOOLABIN
NINDERRY
COOLUM BEACH
VALDORA
YAROOMBA
YANDINA
MAROOCHY RIVER
MT COOLUM
100%

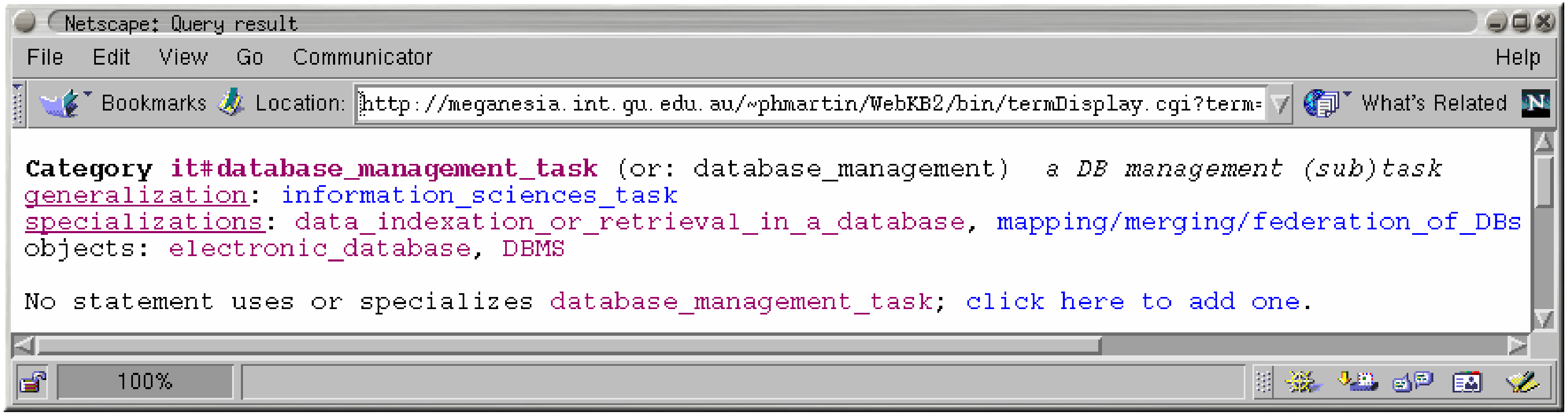


Generated submenus can be used when the tailored menu is insufficient.

More examples of knowledge representation/sharing

- About databases
- About information technology
- Other examples





The small part of the current Information Technology ontology related to databases.