

# C301

# Voice Search Query Structure

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# Voice Search Query

- Today's voice searches
  - Keyword searches
    - Voice dialing—name of the person to be called
    - Calendar—date and time
- Need more powerful searching strategies to access online content via phone
  - SQL databases
  - Web pages
  - Hierarchies of folders and files

# Important decisions

- How users enter a query
- How the user hears and sees the results

# HOW—Voice Only

- Enables use of any telephone at any time from any location
- Difficult to mentally construct a complex query

# HOW—Natural Language-Like

- Difficult to implement
- Frustrates users
  - Confusion about what phrases the user can speak
- Error prone and imprecise
  - Get me all of the records containing white pine **and** all of the records containing blister rust
  - Computer translates to  
select \* where keyword = "white pine" **or** keyword = "blister rust"
- “Fools Gold”
  - Users will find “natural language promises” misleading

# HOW—Text Prompts and Voice Response

- Small screen as a canvas to construct query
  - Acts as human memory extension
  - Allows user to select rather than generate query fragments
  - Incrementally build and edit rather than verbally dictate the entire query

# Build Selection Criteria

|   | Attribute | Constraint | Value |
|---|-----------|------------|-------|
| 1 |           |            |       |

|            |
|------------|
| name       |
| salary     |
| department |

Speak an attribute from this list.

# Build Selection Criteria

|   | Attribute | Constraint | Value |
|---|-----------|------------|-------|
| 1 | salary    |            |       |

|                       |
|-----------------------|
| greater than          |
| equal                 |
| less than             |
| greater than or equal |
| less than or equal    |

Which constraint from this list?



# Build Selection Criteria

|   | Attribute | Constraint | Value |
|---|-----------|------------|-------|
| 1 | name      | less than  |       |

What value? For example, 11,000.

# Build Selection Criteria

|   | Attribute | Constraint | Value  |
|---|-----------|------------|--------|
| 1 | salary    | less than  | 11,000 |

Another criteria?

# Build Selection Criteria

|   | Attribute | Constraint | Value  |
|---|-----------|------------|--------|
| 1 | salary    | less than  | 11,000 |
| 2 |           |            |        |

|            |
|------------|
| name       |
| salary     |
| department |

Speak an attribute from this list.

# Build Selection Criteria

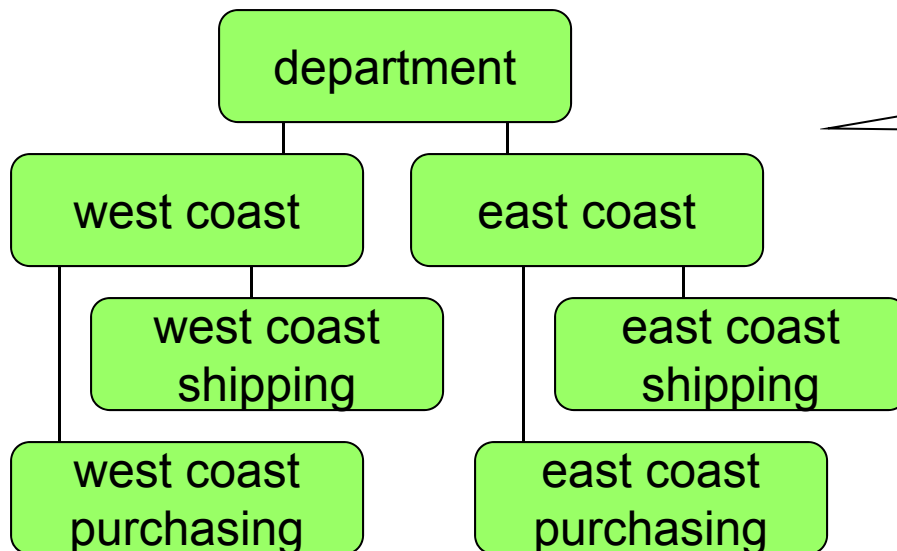
|   | Attribute  | Constraint | Value  |
|---|------------|------------|--------|
| 1 | salary     | less than  | 11,000 |
| 2 | department |            |        |

Which constraint from this list?

- greater than
- equal
- less than
- greater than or equal
- less than or equal

# Build Selection Criteria

|   | Attribute  | Constraint | Value  |
|---|------------|------------|--------|
| 1 | salary     | less than  | 11,000 |
| 2 | department | equals     |        |



Speak a department from this hierarchy.

# Build Selection Criteria

|   | Attribute  | Constraint | Value                    |
|---|------------|------------|--------------------------|
| 1 | salary     | less than  | 11,000                   |
| 2 | department | equals     | west coast<br>purchasing |

Now lets add another criteria...

# Build Selection Criteria

|   | Attribute  | Constraint | Value                 |
|---|------------|------------|-----------------------|
| 1 | salary     | less than  | 11,000                |
| 2 | department | equals     | west coast purchasing |
| 3 | department | equals     | east coast shipping   |

Select criteria 2 and 3  
Make "OR"



# Build Selection Criteria

|      |   | <b>Attribute</b> | <b>Constraint</b> | <b>Value</b>          |
|------|---|------------------|-------------------|-----------------------|
|      | 1 | salary           | less than         | 11,000                |
| 4 OR | 2 | department       | equals            | west coast purchasing |
|      | 3 | department       | equals            | west coast shipping   |



# Build Presentation Criteria

|      | Attribute    | Constraint | Value                 |
|------|--------------|------------|-----------------------|
|      | 1 salary     | less than  | 11,000                |
| 4 OR | 2 department | equals     | west coast purchasing |
|      | 3 department | equals     | east coast shipping   |

|            |
|------------|
| name       |
| salary     |
| department |

Present name,  
department



# Build Presentation Criteria

|      |   | Attribute  | Constraint | Value                 |
|------|---|------------|------------|-----------------------|
|      | 1 | salary     | Less than  | 11,000                |
| 4 OR | 2 | department | equals     | west coast purchasing |
|      | 3 | department | equals     | east coast shipping   |

|                   |
|-------------------|
| <b>name</b>       |
| salary            |
| <b>department</b> |

# Other Presentation Questions

- What fields do you want to hear?
  - All, employee, salary, ...
- What presentation sequence?
  - Employee ascending
- What chunking factor?
  - Present three items at a time
- View, hear, or both?
  - Both

# Review Query

|      | Attribute    | Constraint | Value                 |
|------|--------------|------------|-----------------------|
|      | 1 salary     | less than  | 11,000                |
| 4 OR | 2 department | equals     | west coast purchasing |
|      | 3 department | equals     | east coast shipping   |

|                   |
|-------------------|
| <b>name</b>       |
| salary            |
| <b>department</b> |

|                   |
|-------------------|
| Number of records |
| 243               |

Edit query or review records?

# Edit Query

|      | Attribute    | Constraint | Value                 |
|------|--------------|------------|-----------------------|
|      | 1 salary     | less than  | 11,000                |
| 4 OR | 2 department | equals     | west coast purchasing |
|      | 3 department | equals     | east coast shipping   |

|                   |
|-------------------|
| <b>name</b>       |
| salary            |
| <b>department</b> |

|                   |
|-------------------|
| Number of records |
| 243               |

In criteria 1, change value to 14,000



# Edit Query

|      |   | Attribute  | Constraint | Value                 |
|------|---|------------|------------|-----------------------|
|      | 1 | salary     | less than  | 14,000                |
| 4 OR | 2 | department | equals     | west coast purchasing |
|      | 3 | department | equals     | east coast shipping   |

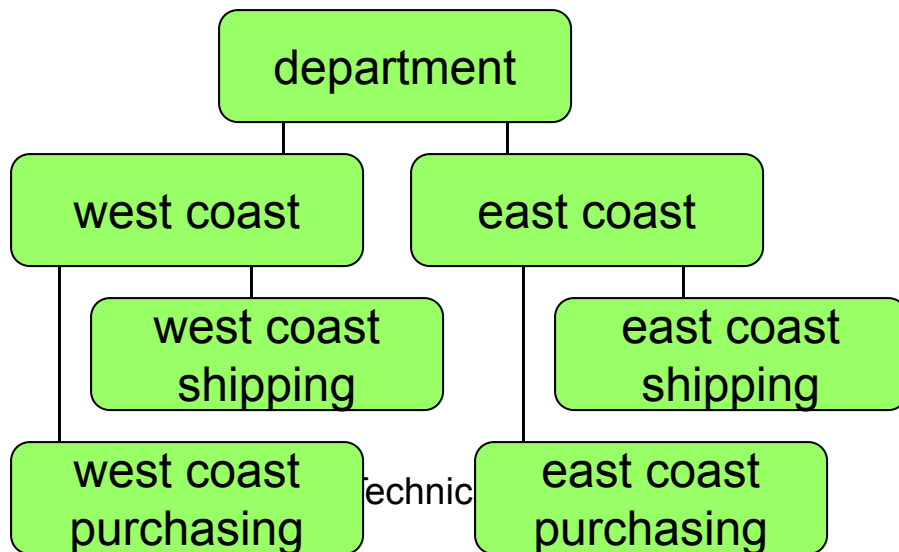
|                   |
|-------------------|
| <b>name</b>       |
| salary            |
| <b>department</b> |

|                   |
|-------------------|
| Number of records |
| 43                |

Edit query or review records?

# Edit Query

|      |   | Attribute  | Constraint | Value                 |
|------|---|------------|------------|-----------------------|
|      | 1 | salary     | less than  | 14,000                |
| 4 OR | 2 | department | equals     | west coast purchasing |
|      | 3 | department | equals     | east coast shipping   |



In criteria 3,  
Change value to  
"east coast"



# Editing Presentation Criteria

|      |   | Attribute  | Constraint | Value                 |
|------|---|------------|------------|-----------------------|
|      | 1 | salary     | less than  | 14,000                |
| 4 OR | 2 | department | equals     | west coast purchasing |
|      | 3 | department | equals     | east coast shipping   |

|                   |
|-------------------|
| <b>name</b>       |
| salary            |
| <b>department</b> |

|                   |
|-------------------|
| Number of records |
| 55                |

Edit query or review records?



# Review Records

| <b>name</b>   | <b>department</b>       |
|---------------|-------------------------|
| <b>able</b>   | <b>accounting</b>       |
| <b>baker</b>  | <b>sales</b>            |
| <b>carson</b> | <b>customer service</b> |

Previous (0)

Next (50)

# What about Web Pages and Unstructured Files?

- Use metadata to improve search
  - Improve recall
  - Improve precision
  - Decrease search time

# Metadata

- Metadata = data about data
- Used to locate requested data quickly
- Examples of metadata from real life
  - Table of contents at the front of a book
  - Index at the back of a book
  - Card catalog in a library
  - Directory of the day's events posted in a hotel lobby

OWL (Web Ontology Language)

<http://www.w3.org/2004/OWL/>

RDF (Resource Data Format)

<http://www.w3.org/RDF/>

<meta> and <metadata> tags in XML documents

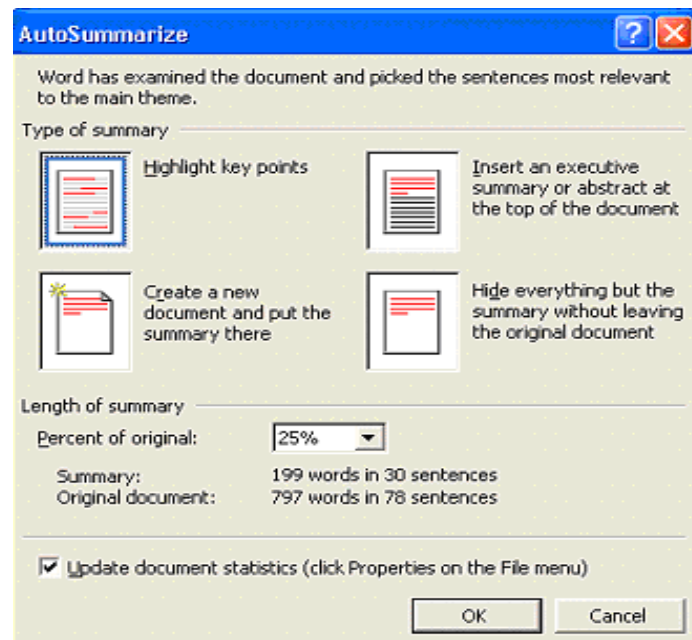
<http://dublincore.org/>

XML tags

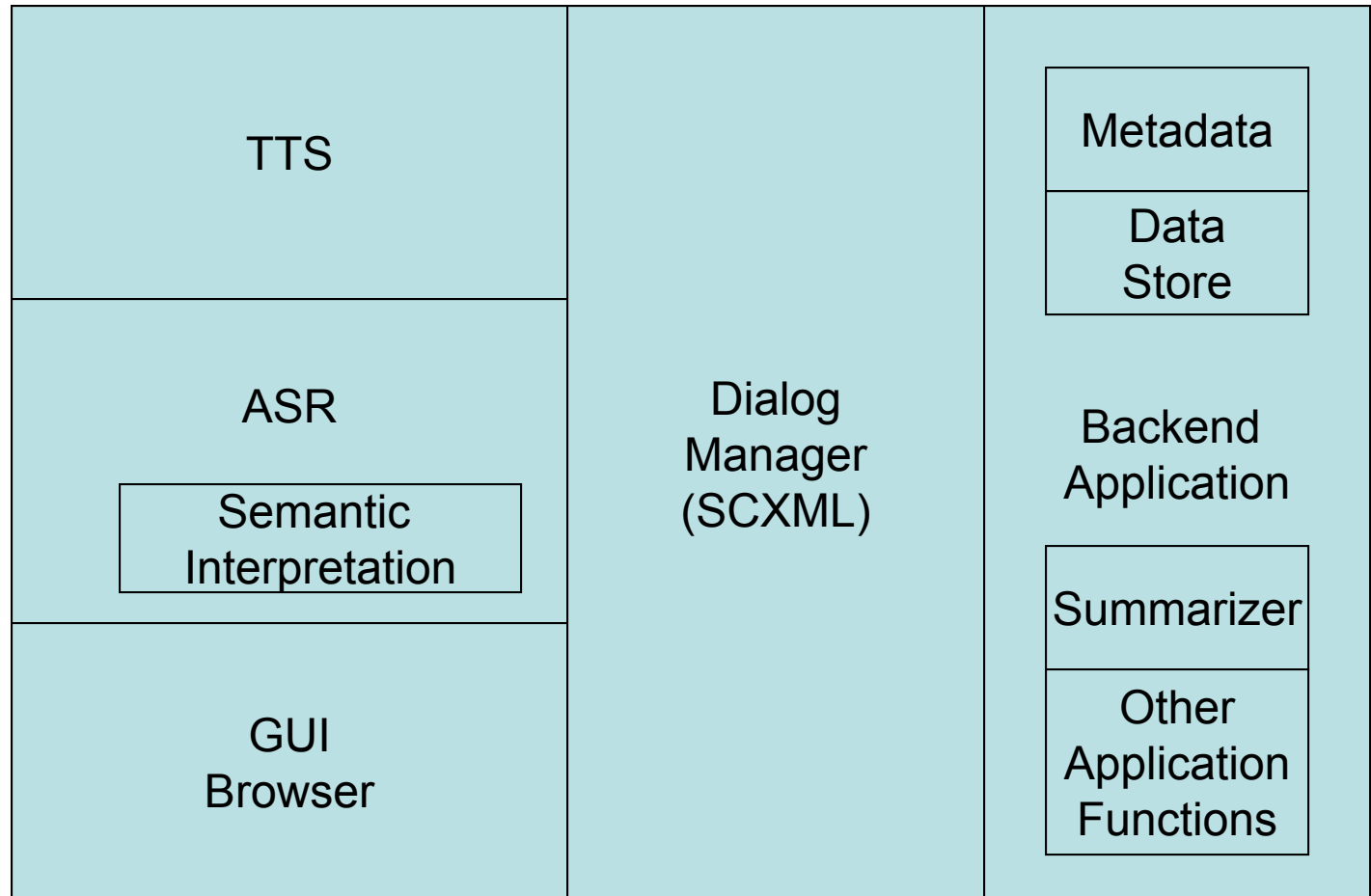
<http://www.w3.org/XML/>

# Use Summarization to Generate Abstracts

- Pertinence Summarizer
  - [http://www.pertinence.net/produits\\_en.html#ps](http://www.pertinence.net/produits_en.html#ps)
- Autosummarize in Microsoft Word



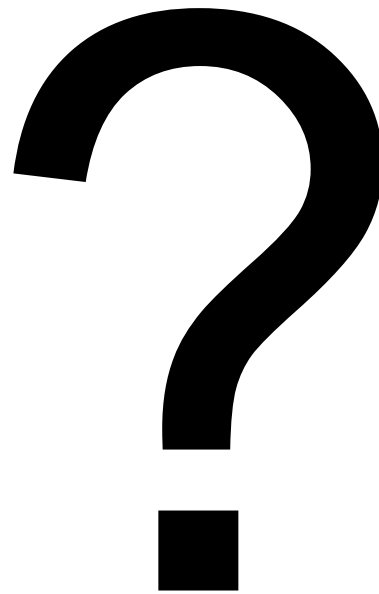
# Architecture



# Summary

- How users enter a query
  - Voice with small screen as a scratch pad
- How the user hears and sees the results
  - Visually, verbally, both

Q & A



# Backup



# Metrics—Recall and Precision

- Precision is the fraction of the documents retrieved that are relevant to the user's information need.

$$\text{precision} = \frac{|\{\text{relevant documents}\} \cap \{\text{retrieved documents}\}|}{|\{\text{retrieved documents}\}|}$$

- Recall is the fraction of the documents that are relevant to the query that are successfully retrieved.

$$\text{recall} = \frac{|\{\text{relevant documents}\} \cap \{\text{retrieved documents}\}|}{|\{\text{relevant documents}\}|}$$

# Metrics—Query Power

