

Source Capabilities

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Source capabilities [YGMU99]

Limited interface

- sources (or source wrappers) support only **limited** query patterns
- mediators defined using **views**
- full query evaluation at the **mediator** level

Issues

- describing source (wrapper) capabilities
- describing mediator capabilities
- capability-based query rewriting

Templates

- template \equiv a vector of attribute **adornments**
- sources export sets of templates
- view templates depend on mediator properties:
 - basic evaluation
 - postprocessing
 - passing bindings between join arguments
- a query has to match some view template to be **answerable**

Adornments

Attribute adornments

- ① **f**: the attribute may or may not be specified in the query (*free*)
- ② **u**: the attribute cannot be specified in the query (*unspecifiable*)
- ③ **b**: the attribute must be specified in the query (*bound*)
- ④ **c[S]**: the attribute must be specified and its value must be among the elements of the set **S** (*constant*)
- ⑤ **o[S]**: the attribute may or may not be specified in the query but, if it is specified, its value must be among the elements of the set **S** (*optional*)

Matching

	f	o[S]	b	c[S]	u
constant <i>a</i>	+	$a \in S$	+	$a \in S$	-
variable	+	+	-	-	+

Union views

Deriving view templates

- composing base-view templates attribute-wise
- all combinations are considered but some may yield no result
- repeat if more than two views (composition is commutative and associative)

Composition of adornments

	f	o[S ₂]	b	c[S ₂]	u
f	f	o[S ₂]	b	c[S ₂]	u
o[S ₁]	o[S ₁]	o[S ₁ ∩ S ₂]	c[S ₁]	c[S ₁ ∩ S ₂]	u
b	b	c[S ₂]	b	c[S ₂]	—
c[S ₁]	c[S ₁]	c[S ₁ ∩ S ₂]	c[S ₁]	c[S ₁ ∩ S ₂]	—
u	u	u	—	—	u

Other operations

Join

- join attributes: as for union
- non-join attributes: copy base-view adornments

Selection

- copy base-view adornments

Projection

- copy base-view adornments
- hidden attributes have to have **f**, **o**, or **u** adornments

Postprocessing for union

Filtering

- adding a **filter** operation
- converting **u** and **o** to **f**

Composition of adornments with filtering

	f	$o[S_2]$	b	$c[S_2]$	u
f	f	f	b	$c[S_2]$	f
$o[S_1]$	f	f	b	$c[S_2]$	f
b	b	b	b	$c[S_2]$	b
$c[S_1]$	$c[S_1]$	$c[S_1]$	$c[S_1]$	$c[S_1 \cap S_2]$	$c[S_1]$
u	f	f	b	$c[S_2]$	f

Postprocessing for join

Join

- pass the bindings from the first argument of the join to the second argument
- converting b in the second argument to f

Composition of adornments with passing bindings

	f	$o[S_2]$	b	$c[S_2]$	u
f	f	f	f	$c[S_2]$	f
$o[S_1]$	f	f	f	$c[S_2]$	f
b	b	b	b	$c[S_2]$	b
$c[S_1]$	$c[S_1]$	$c[S_1]$	$c[S_1]$	$c[S_1 \cap S_2]$	$c[S_1]$
u	f	f	f	$c[S_2]$	f

Postprocessing for selection

Selection

- converting **u** and **o** to **f** through filtering
- converting **b** to **f** if the value of the attribute can be inferred from the selection condition
- converting **c[S]** to **f** if some element of **S** can be inferred from the selection condition

Dynamic mediation

A query may be **answerable** in a given database state even if it does not match any of the view templates.

Liberal and conservative templates

- **liberal**: convert **c** (in the second argument) to **f** for joins
- **conservative**: as before

Query-template matching

- query **answerable** if it matches at least one conservative template
- query **not answerable** if it does not match any of the liberal templates
- query **may be answerable** otherwise: **dynamic** execution



R. Yerneni, H. Garcia-Molina, and J. Ullman.

Computing Capabilities of Mediators.

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