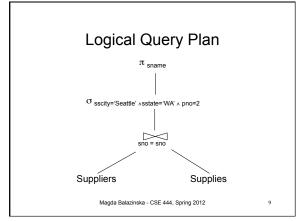


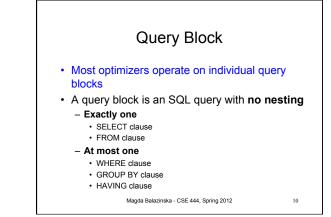
Extended Algebra Operators

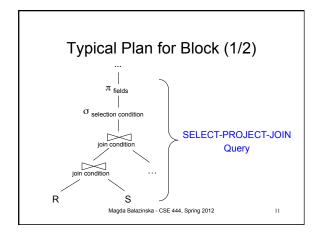
- Union ∪, intersection ∩, difference -
- Selection o
- Projection π
- Join🖂
- Duplicate elimination δ
- Grouping and aggregation γ
- Sorting τ
- Rename p

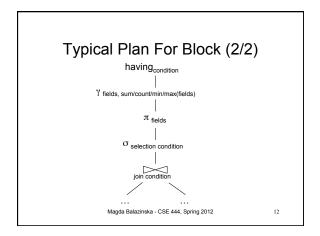
Magda Balazinska - CSE 444, Spring 2012

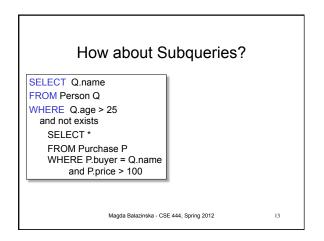
8

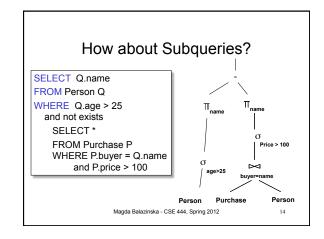


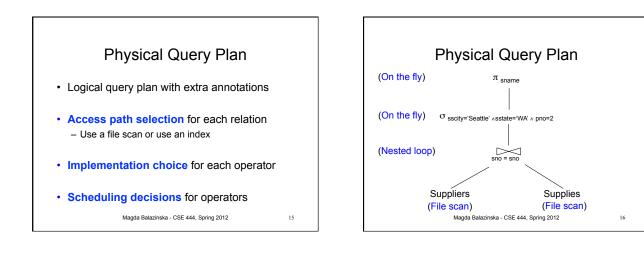


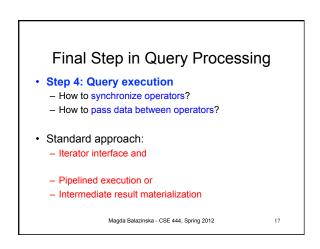


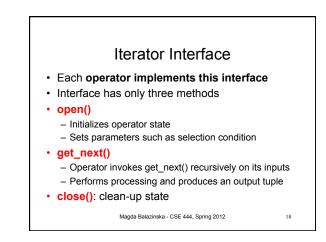


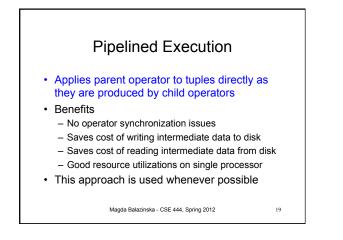


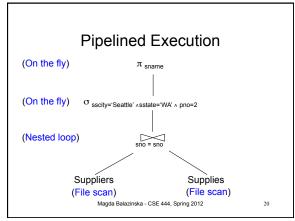


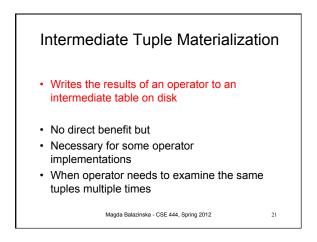


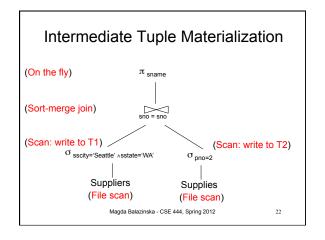


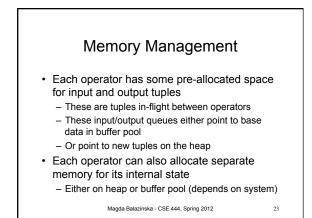


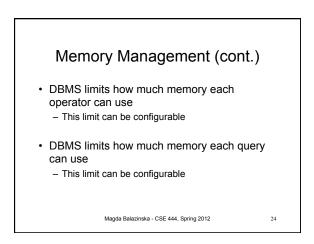












Next: Operator Algorithms

- Why is it important to study?
- How to compare implementations/algorithms?
 - Using a cost model: IO, CPU, (and network bw)
- Later, will see how this plays a role in optimization
- Some key design criteria
 - Cost
 - Memory utilization (maximum available memory)
 - Load balance (for parallel operators)

Magda Balazinska - CSE 444, Spring 2012

25