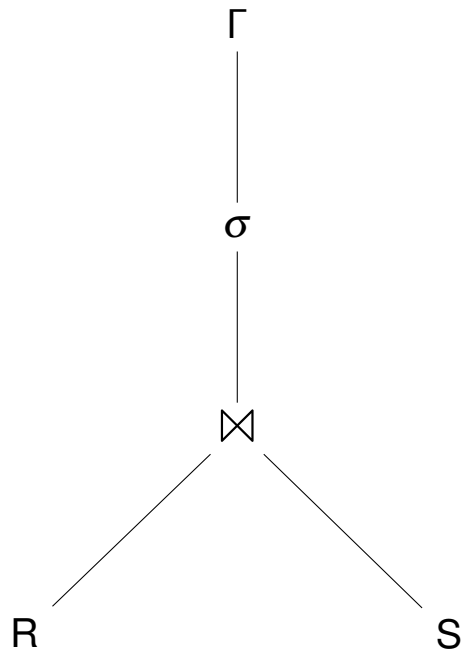# Programming Assignment: Operators

- Implement the following physical operators in the iterator model:
  - Print
  - Projection
  - Select
  - Sort
  - HashJoin
  - HashAggregation
- Optional:
  - Union
  - UnionAll
- For 2 additional points:
  - Intersect
  - IntersectAll
  - Except
  - ExceptAll
- Supported types for registers: `INT64`, `CHAR(16)`
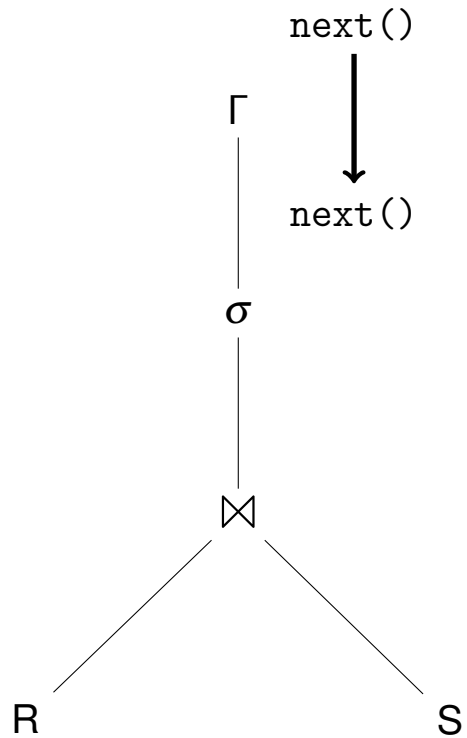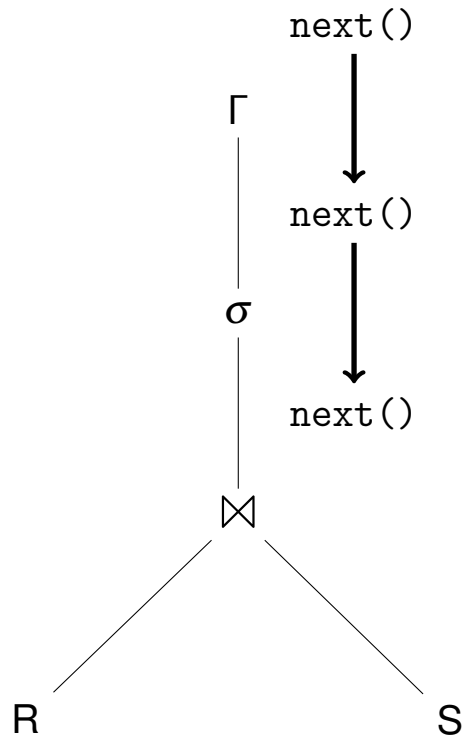
Iterator Model Operators

Γ

|

σ

|

⋈

R   S

Iterator Model Operators

next()

Γ

σ

⋈

R   S
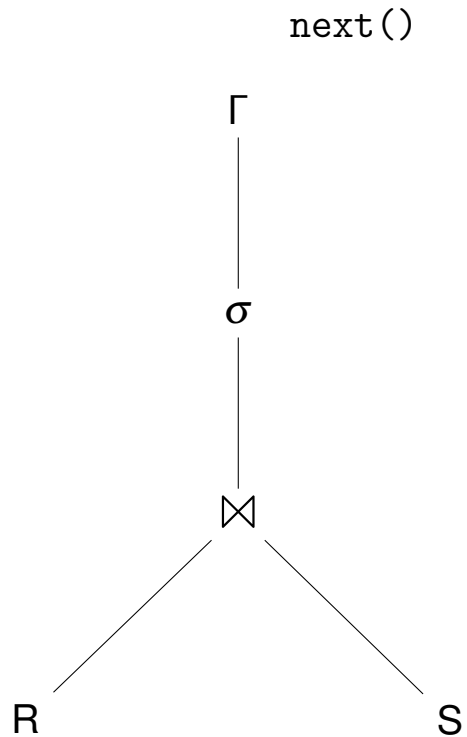
Call next() on root operator (aggregation)

Iterator Model Operators

next()

⌐

next()

σ

⋈

R   S

Call next() on selection

Iterator Model Operators

next()

Γ

next()

σ

next()

⋈

R   S

Call `next()` on hash join

Iterator Model Operators

next()

Γ

next()
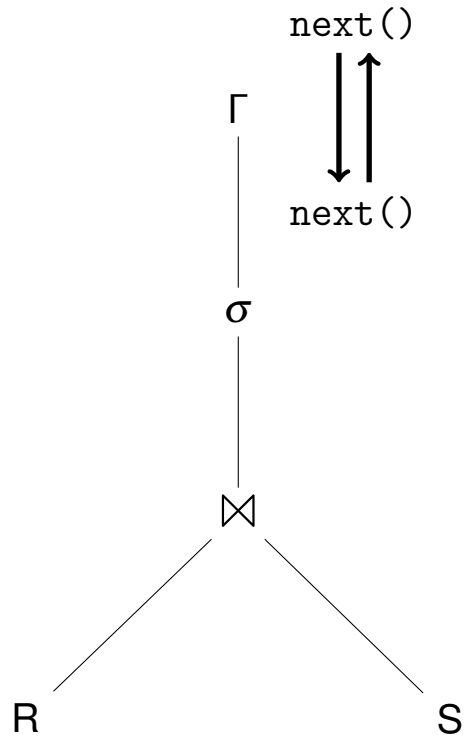
σ

next()

⋈

next()

R   S
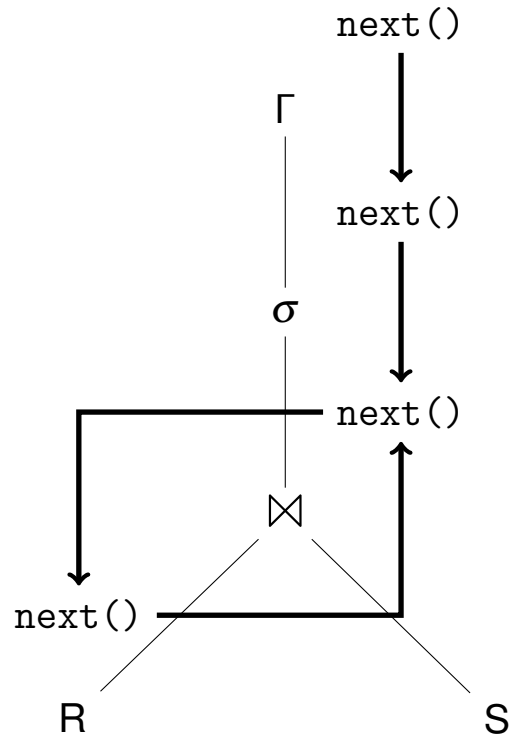
Build hash table for the left side by calling `next()` of R repeatedly

Iterator Model Operators
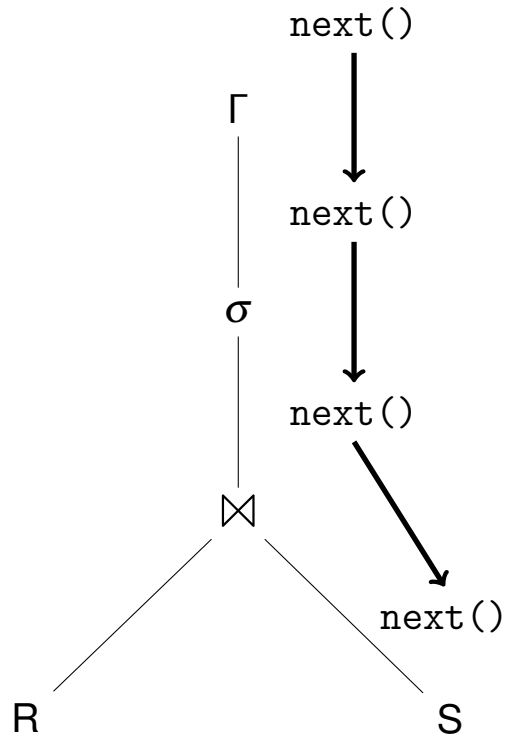
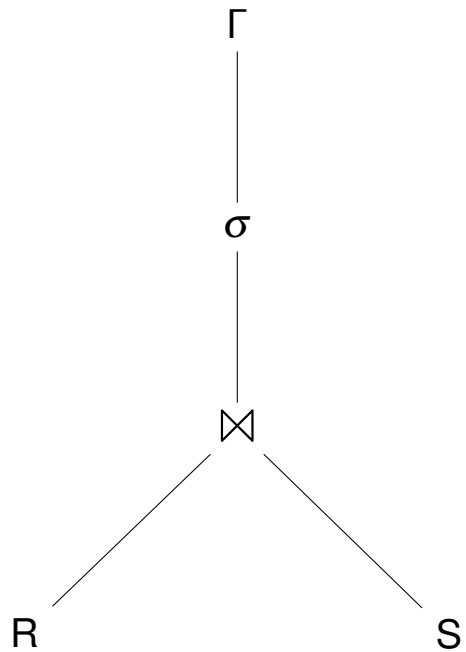Call `next()` on S, returns true as long as there are tuples left

Iterator Model Operators

`next()`

Γ

`next()`

σ

$\bowtie$

R   S

Build hash table for aggregation by calling `next()` of the selection repeatedly

Iterator Model Operators

`next()`

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σ

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R   S

Generate next value from the hash table