

- 1)  $\sigma_{In\_Stock > 0}$  **Book**
- 2)  $\pi_{o.Order\_Id, o.Order\_Status, o.Amount, b.Book\_Name}$  **Orders o**  $\bowtie$   $o.Book\_Id = b.Book\_Id$   
**Book b**  $\bowtie$   $s.Supplier\_Id = o.Supplier\_Id$  **Supplier s**
- 3) **Customer**
- 4)  $\pi_{s.Supplier\_Name}$   $\sigma_{Book\_Name = ?}$  **Supplier s**  $\bowtie$   $hs.Supplier\_Id = s.Supplier\_Id$   
**has\_supplier hs**  $\bowtie$   $b.Book\_Id = hs.Book\_Id$  **Book b**
- 5)  $\pi_{t.Transaction\_Id, t.Transaction\_Date, s.Firstname \text{ AS } Salesman\_Firstname, s.Lastname \text{ AS } Salesman\_Lastname, c.Firstname, c.Lastname}$   $\sigma_{Transaction\_Date \geq ? \text{ AND } Transaction\_Date \leq ?}$   
**Transaction t**  $\bowtie$   $t.Customer\_Number = c.Customer\_Number$  **Customer c**  $\bowtie$   $t.Salesman\_Id = s.Salesman\_Id$  **Salesman s**
- 6)  $\pi_{d.Discount\_Id, b.Book\_Name, d.Start\_Date, d.End\_date, d.Amount}$   $\sigma_{is\_Specific\_Discount=false}$  **Discount d**  $\bowtie$   $d.Book\_Id=b.Book\_Id$  **Book b**
- 7)  $\sigma_{Book\_Name = ?}$  **Book**
- 8)  $\pi_{s.Supplier\_Name}$   $\sigma_{Book\_Name = ?}$  **Supplier s**  $\bowtie$   $hs.Supplier\_Id = s.Supplier\_Id$   
**has\_supplier hs**  $\bowtie$   $b.Book\_Id = hs.Book\_Id$  **Book b**
- 9)  $\pi_{TotalAmount}$   $\gamma_{SUM(bb.Amount) \rightarrow TotalAmount}$   $\sigma_{t.Transaction\_Date \geq ? \text{ AND } b.Book\_Name = ?}$  **Transaction t**  $\bowtie$   $bb.Transaction\_Id = t.Transaction\_Id$  **Buy\_Book bb**  
 $\bowtie$   $b.Book\_Id = bb.Book\_Id$  **Book b**
- 10)  $\pi_{TotalAmount}$   $\gamma_{SUM(bb.Amount) \rightarrow TotalAmount}$   $\sigma_{t.Transaction\_Date \geq ? \text{ AND } t.Customer\_Number = ?}$  **Transaction t**  $\bowtie$   $bb.Transaction\_Id = t.Transaction\_Id$  **Buy\_Book bb**
- 11)  $\pi_{Customer\_Number, Max}$   $\gamma_{MAX (TotalAmount) \rightarrow Max}$   $\rho_{AmountSums}$  ( $\pi_{TotalAmount, t.Customer\_Number}$   $\gamma_{t.Transaction\_Id, t.Customer\_Number ; SUM(bb.Amount) \rightarrow TotalAmount}$   $\sigma_{t.Transaction\_Date \geq ?}$  **Transaction t**  $\bowtie$   $bb.Transaction\_Id = t.Transaction\_Id$  **Buy\_Book bb** )
- 12)  $\pi_{TotalAmount, Supplier\_Name}$   $\gamma_{SUM(o.Amount) \rightarrow TotalAmount}$   $\rho_{SupplierAmount}$  ( $\pi_{AmountSum, Supplier\_Name}$   $\gamma_{o.Supplier\_Id; SUM(o.Amount) \rightarrow TotalAmount}$  **Orders o**  $\bowtie$   $o.Supplier\_Id = s.Supplier\_Id$  **Supplier s**)
- 13)  $\pi_{Book\_Name, AmountSum}$   $\gamma_{o.Book\_Id ; SUM(o.Amount) \rightarrow AmountSum}$   $\sigma_{o.Order\_Date \geq ? \text{ AND } o.Order\_Date \leq ?}$  **Orders o**  $\bowtie$   $b.Book\_Id = o.Book\_Id$  **Book b**

- 14)  $\Pi$  Book\_Name, AmountSold  $\gamma$  o.Book\_Id ; SUM(o.Amount) - b.In\_Stock  $\rightarrow$  AmountSold  $\sigma$  o.Order\_Date >= ? AND o.Order\_Date <= ? **Orders o**  $\bowtie$  b.Book\_Id = o.Book\_Id **Book b**
- 15)  $\Pi$  t.Transaction\_Date, b.Price, bb.Book\_Id, bb.Amount  $\sigma$  t.Customer\_Number = ? AND t.Transaction\_Date >= ? **Transaction t**  $\bowtie$  bb.Transaction\_Id = t.Transaction\_Id **Buy\_Book bb**  $\bowtie$  b.Book\_Id = bb.Book\_Id **Book b**
- 16)  $\Pi$  'Q1', Total\_Amount  $\gamma$  ; SUM(bb.Amount \* b.Price)  $\rightarrow$  Total\_Amount  $\sigma$  t.Transaction\_Date >= ? AND t.Transaction\_Date <= ? **Book b**  $\bowtie$  bb.Book\_Id = b.Book\_Id **Buy\_Book bb**  $\bowtie$  bb.Transaction\_Id = t.Transaction\_Id **Transaction t**
- $\cup$   $\Pi$  'Q2', Total\_Amount  $\gamma$  ; SUM(bb.Amount \* b.Price)  $\rightarrow$  Total\_Amount  $\sigma$  t.Transaction\_Date >= ? AND t.Transaction\_Date <= ? **Book b**  $\bowtie$  bb.Book\_Id = b.Book\_Id **Buy\_Book bb**  $\bowtie$  bb.Transaction\_Id = t.Transaction\_Id **Transaction t**
- $\cup$   $\Pi$  'Q3', Total\_Amount  $\gamma$  ; SUM(bb.Amount \* b.Price)  $\rightarrow$  Total\_Amount  $\sigma$  t.Transaction\_Date >= ? AND t.Transaction\_Date <= ? **Book b**  $\bowtie$  bb.Book\_Id = b.Book\_Id **Buy\_Book bb**  $\bowtie$  bb.Transaction\_Id = t.Transaction\_Id **Transaction t**
- $\cup$   $\Pi$  'Q4', Total\_Amount  $\gamma$  ; SUM(bb.Amount \* b.Price)  $\rightarrow$  Total\_Amount  $\sigma$  t.Transaction\_Date >= ? AND t.Transaction\_Date <= ? **Book b**  $\bowtie$  bb.Book\_Id = b.Book\_Id **Buy\_Book bb**  $\bowtie$  bb.Transaction\_Id = t.Transaction\_Id **Transaction t**
- 17)  $\Pi$  New\_Customer  $\gamma$  ; COUNT(Customer\_Number)  $\rightarrow$  New\_Customer  $\sigma$  Customer\_Date >= ? Date <= ? **Customer**
- 18)  $\Pi$  OrdersPrice  $\gamma$  Supplier\_Id; SUM(o.Amount \* b.Price)  $\rightarrow$  OrdersPrice  $\sigma$  Supplier\_Id = ? AND Order\_Date >= ? AND Order\_Date <= ? **Orders o**  $\bowtie$  b.Book\_Id = o.Book\_Id **Book b**
- 19)  $\Pi$  Transactions  $\gamma$  ; COUNT(Transaction\_Id)  $\rightarrow$  Transactions  $\sigma$  Salesman = ? **Transaction**
- 20)  $\Pi$  b.Book\_Name, Total\_Amount  $\gamma$  b.Book\_Id ; SUM(bb.Amount)  $\rightarrow$  Total\_Amount  $\sigma$  rownum() > 0 AND rownum()  $\leq$  10 AND o.Order\_Date <= ? **T** Total\_Amount desc **Book b**  $\bowtie$  bb.Book\_Id = b.Book\_Id **Buy\_Book**