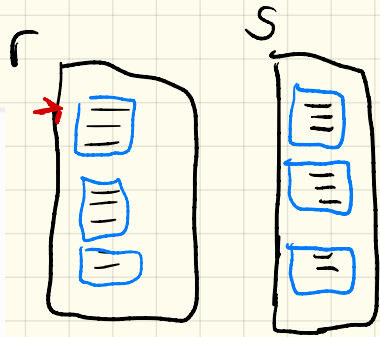


# Joins (cont)

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## Block-nested loop join

```
for each block  $B_r$  of  $r$  do begin
  for each block  $B_s$  of  $s$  do begin
    for each tuple  $t_r$  in  $B_r$  do begin
      for each tuple  $t_s$  in  $B_s$  do begin
        test pair  $(t_r, t_s)$  to see if they satisfy the join condition
        if they do, add  $t_r \cdot t_s$  to the result;
      end
    end
  end
end
```



- Analysis
- assure neither <sup>relation</sup> fits in memory
  - # of transfers:  $b_r \times b_s + b_r$
  - # seeks  $2b_r$  seeks

Other ways to speed up:

- use bigger blocks in outer loops
- scan forward then backward
- use the schema to create early termination points