```
SELECT fid
FROM   friend AS f, update AS u
WHERE  f.uid= uid1 AND f.fid=u.uid AND u.country=UK
```

A Conventional DBMS plan

find all my friends who have online update records from UK

- **friend**(uid, fid)
- **update**(id, uid, country, date, post, ...)

S1: for each **`friend`**, find a set F_1 of all my friends

S2: for each `fid` f_0 in $\boldsymbol{F_1}$, check whether f_0 has a record in **`update`** from UK *a nested loop*

4

A Conventional Query Plan

a linear scan

Facebook:

- billions of **`friend`** tuples
- trillions of **`update`** tuples
- 500+TB new data per day

Fast! 12GB/s
15TB of size

- S1 takes 20 mins ($|F1|=100$)
- S2 takes 2000 mins

Polynomial time queries become intractable on big data

A Conventional Query Plan

find all my friends who have online update records from UK

- **`friend`**`(uid, fid)`
- **`update`**`(id, uid, country, date, post, ...)`

```
SELECT fid
FROM   friend AS f, update AS u
WHERE  f.uid= uid1 AND f.fid=u.uid AND u.country=UK
```

A Conventional DBMS plan

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a nested loop

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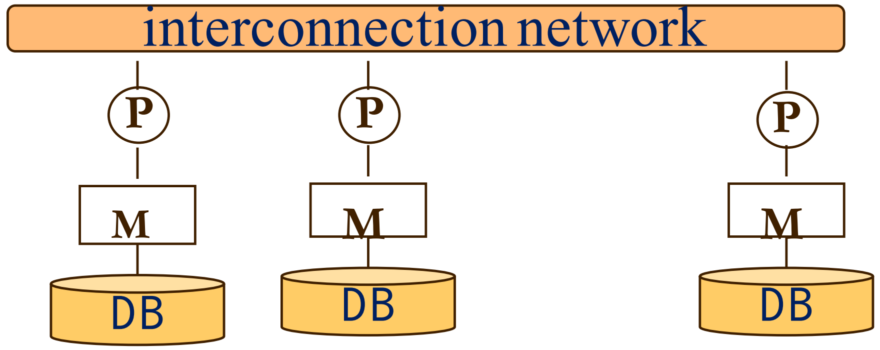
Common Wisdom

- **Parallel query processing**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