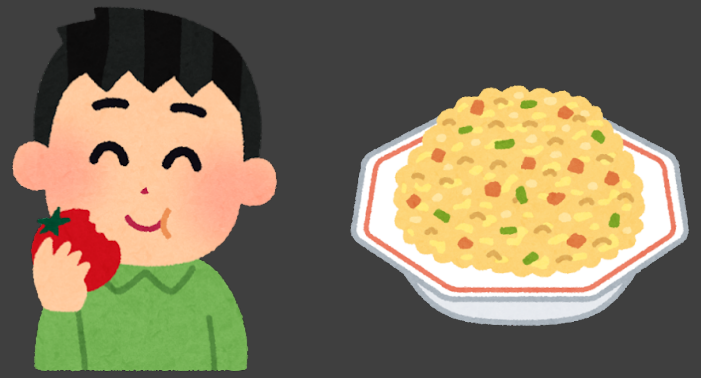
如何制作炒饭

SICP 2021 Optional Lecture

Tianyun Zhang

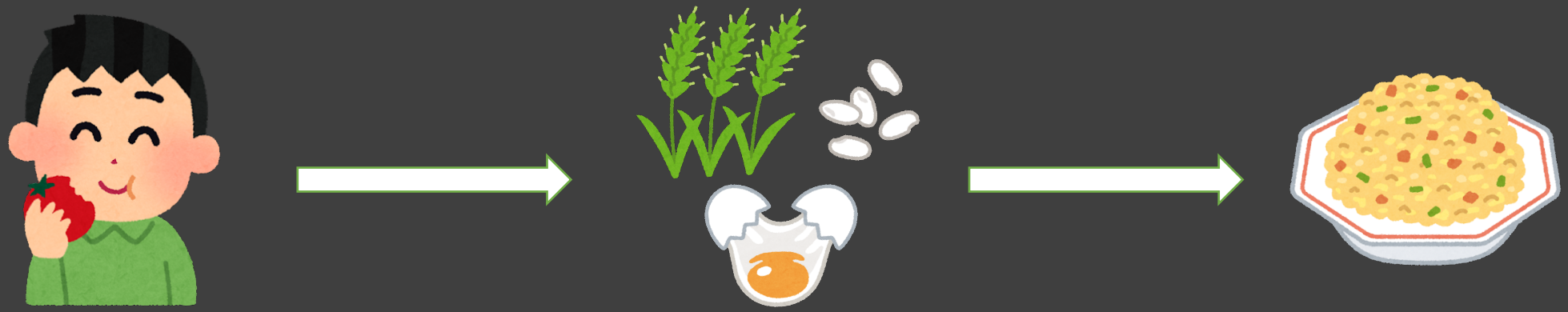
*images from Team17, Irasutoya

蛋炒饭



张三从新西方厨艺学校毕业，准备开一家饭店制作蛋炒饭

蛋炒饭



为了制作蛋炒饭，张三必须去买米、蛋等原料

第一位顾客

张三的饭店开张了，迎来了第一个客人

张三花了30分钟去菜场买菜，花了20分钟做了蛋炒饭
顾客对张三的厨艺非常满意

一桌顾客

张三的炒饭太好吃了，第二天来了一桌顾客

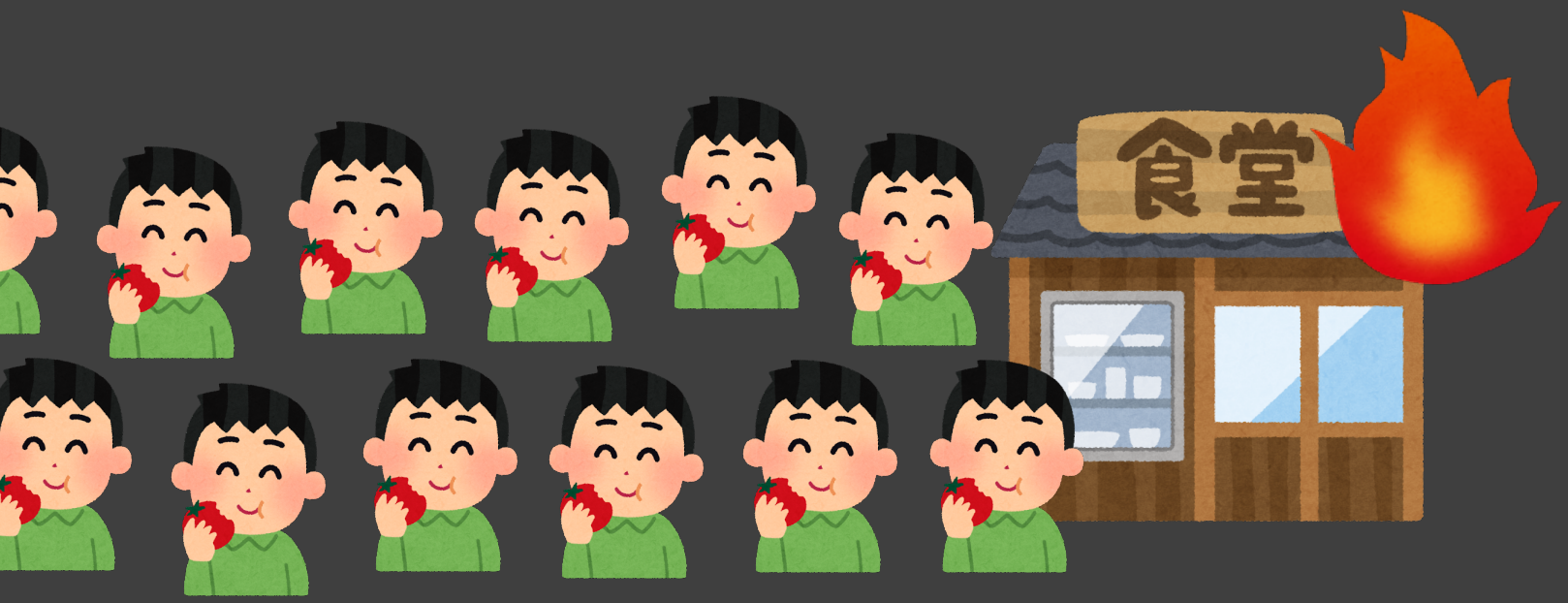
张三发现可以一次买很多原料，然后做四次蛋炒饭

一桌顾客

张三花了30分钟去菜场买菜，花了80分钟做了四个蛋炒饭

顾客发现非常好吃，非常满意，张三的名声越来越响了

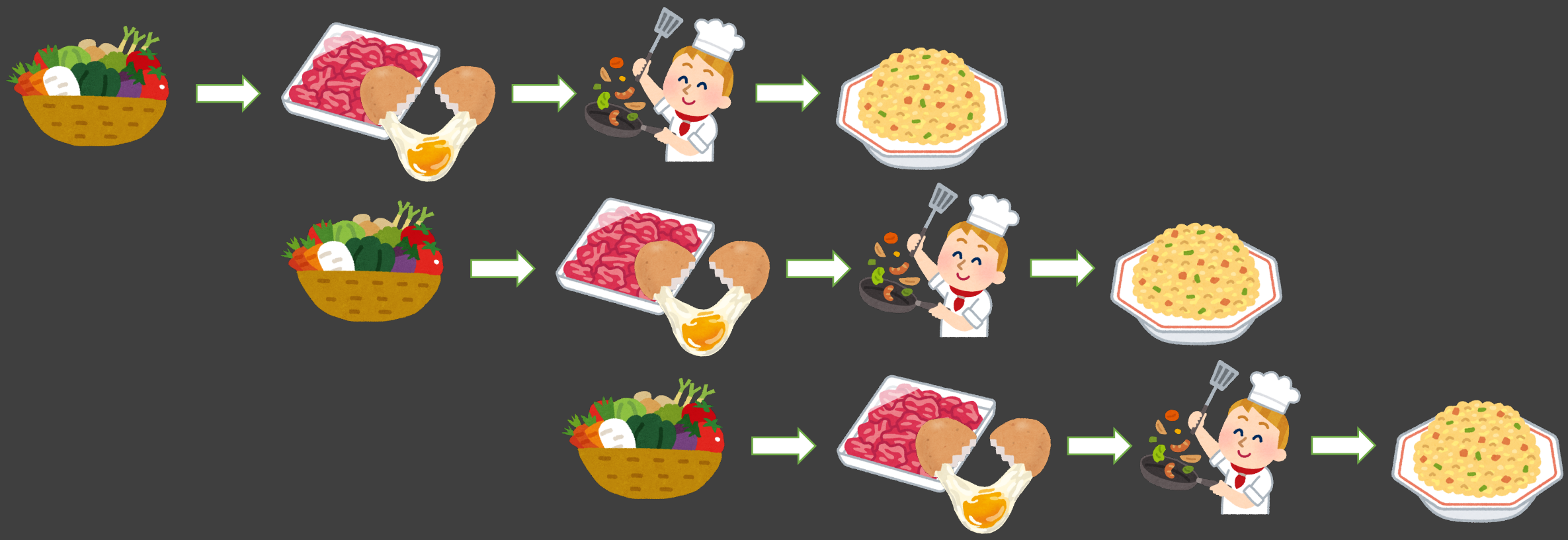
越来越多的顾客



张三的名声越来越响，越来越多的人来吃蛋炒饭

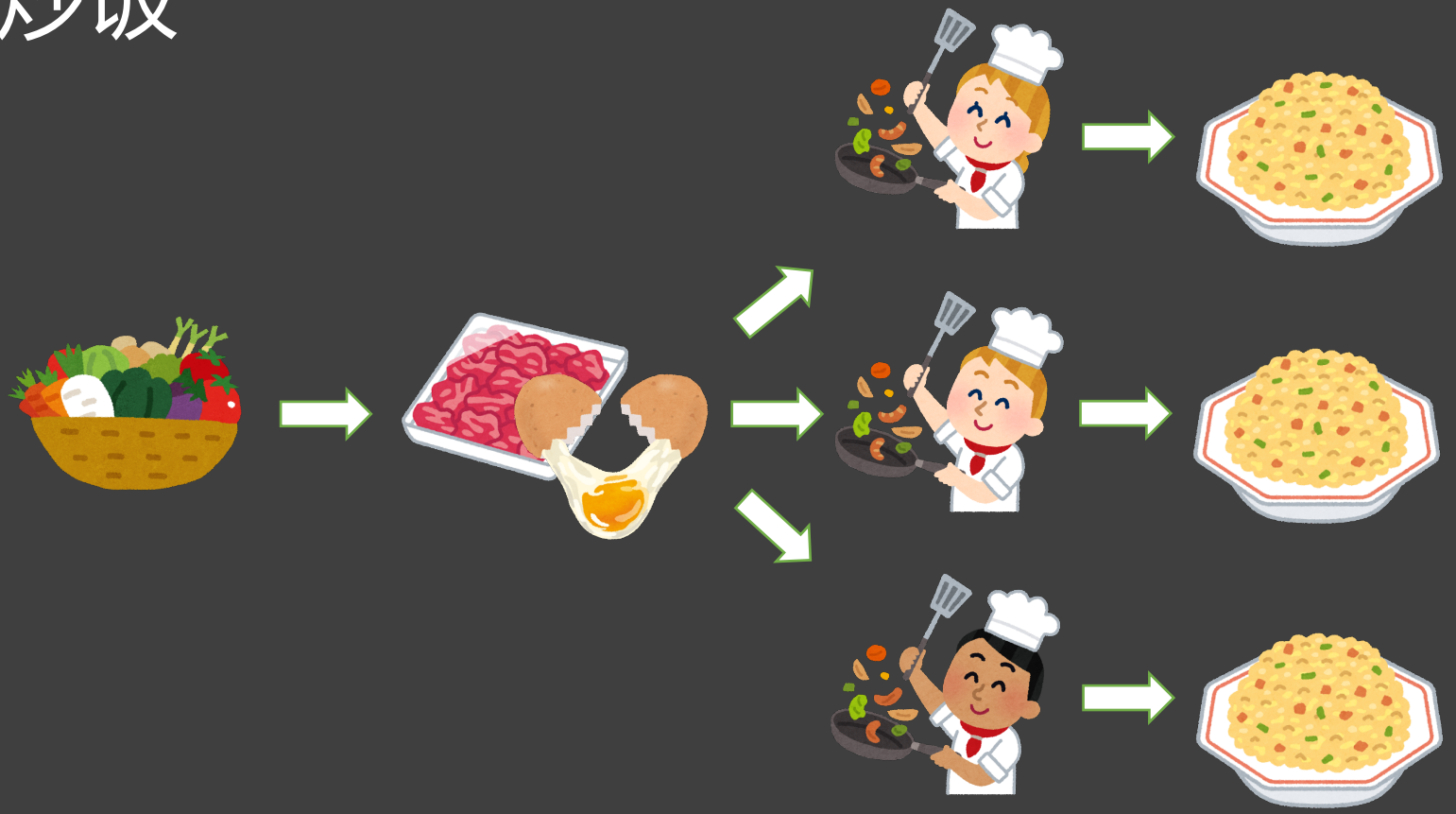
制作蛋炒饭的压力越来越大，张三忙不过来了

更快的蛋炒饭



张三发现制作蛋炒饭是一个流水线的工作，可以多雇几个人来提高效率

更快的蛋炒饭



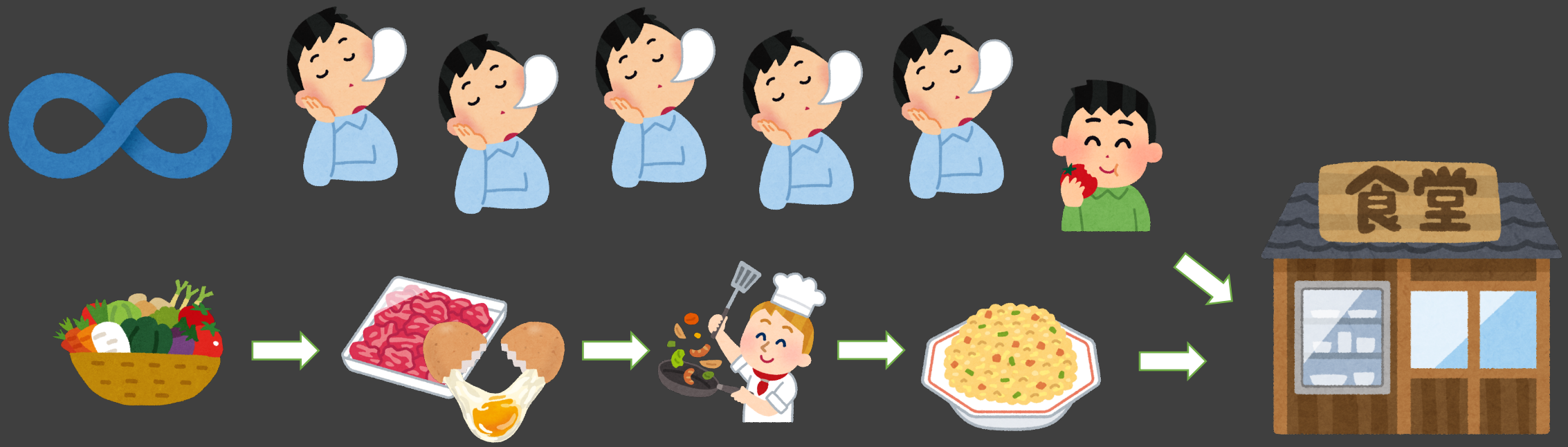
张三发现炒蛋炒饭是流水线里最慢的步骤，可以多找几个人一起炒

越来越多的越来越多的顾客

来吃蛋炒饭的顾客越来越多了

但是没有哪家菜场能买这么多菜
张三的店也存不下这么多菜

越来越多的越来越多的顾客



张三招募了一个跑腿的，买到一个鸡蛋就做一个蛋炒饭
等到跑腿的买够了足够多的鸡蛋，就能做出足够多的蛋炒饭
张三的店越来越好了

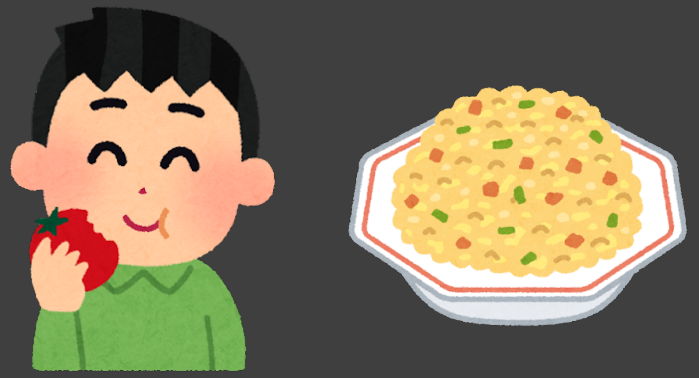
THE END?

如何处理数据

SICP 2021 Optional Lecture
Tianyun Zhang

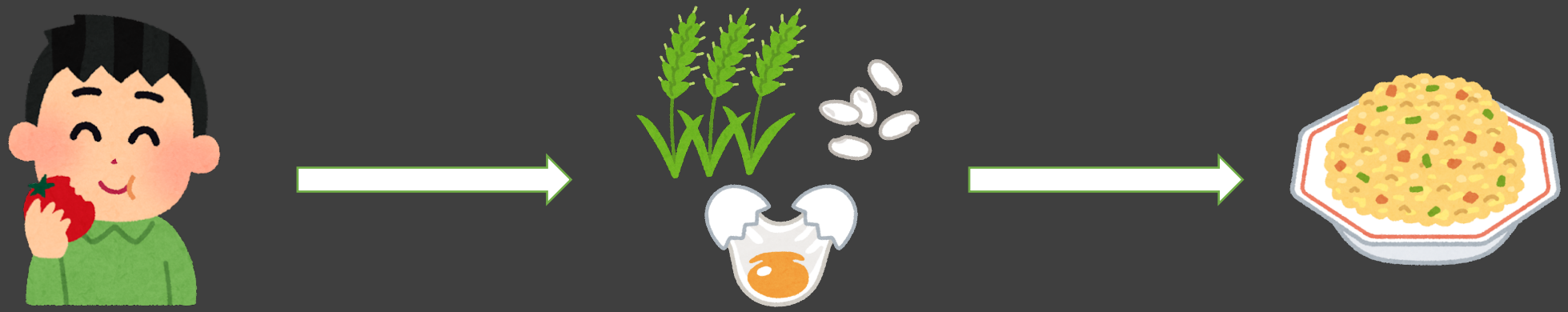
*images from Team17, Irasutoya

作业成绩



张三从新南方编程学校毕业，准备开一个OJ查询作业成绩

作业成绩



为了制作作业成绩，张三必须去获得所有人提交的原始数据

第一位学生

张三的OJ开张了，迎来了第一位学生

张三花了30ms查找了学生的提交，花了20ms计算学生的成绩
学生对张三的代码非常满意

一班学生

张三的OJ太好用了，第二天来了一班学生

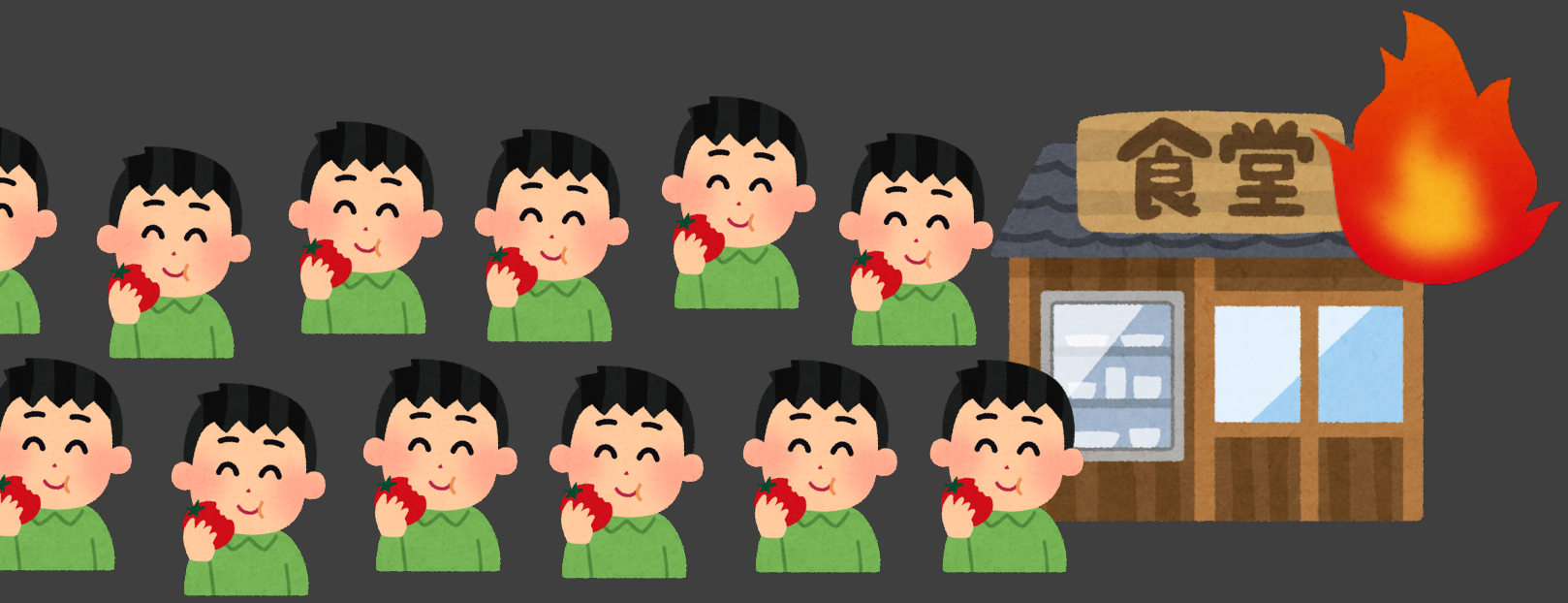
张三发现可以一次查很多提交，然后算几个人的成绩

一班学生

张三花了300ms去查找提交，花了800ms算了四个成绩

学生发现非常准确，非常满意，张三的名声越来越响了

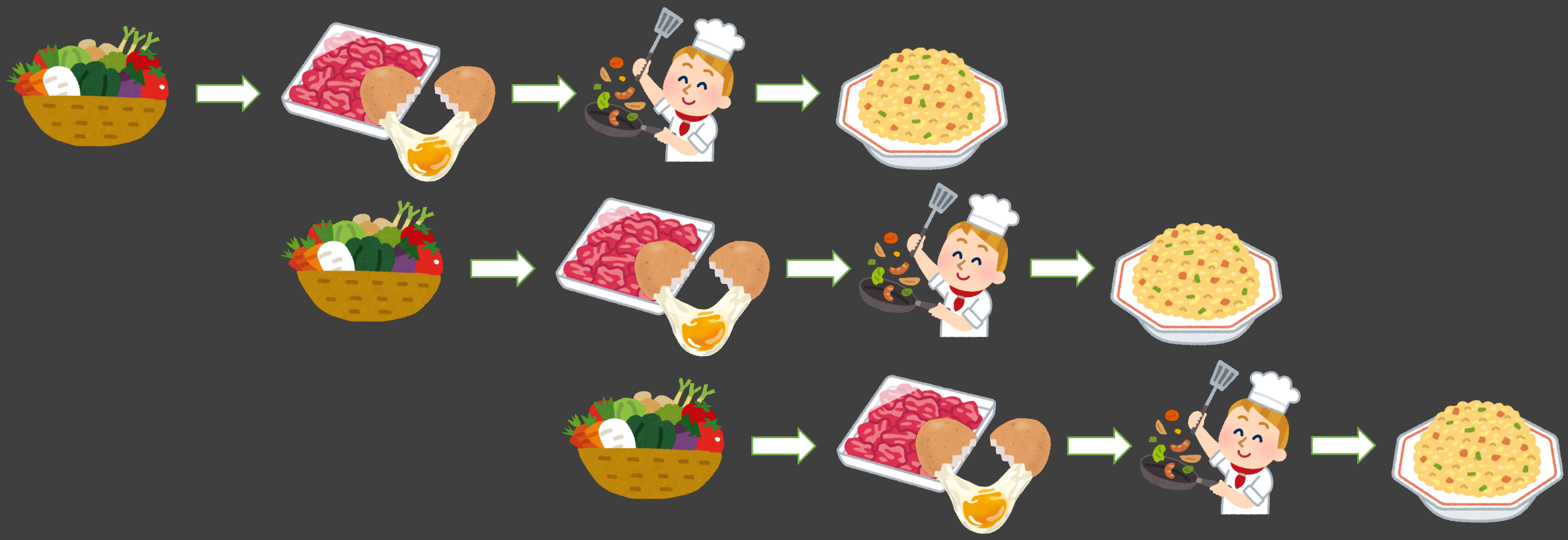
越来越多的学生



张三的名声越来越响，越来越多的人来查成绩

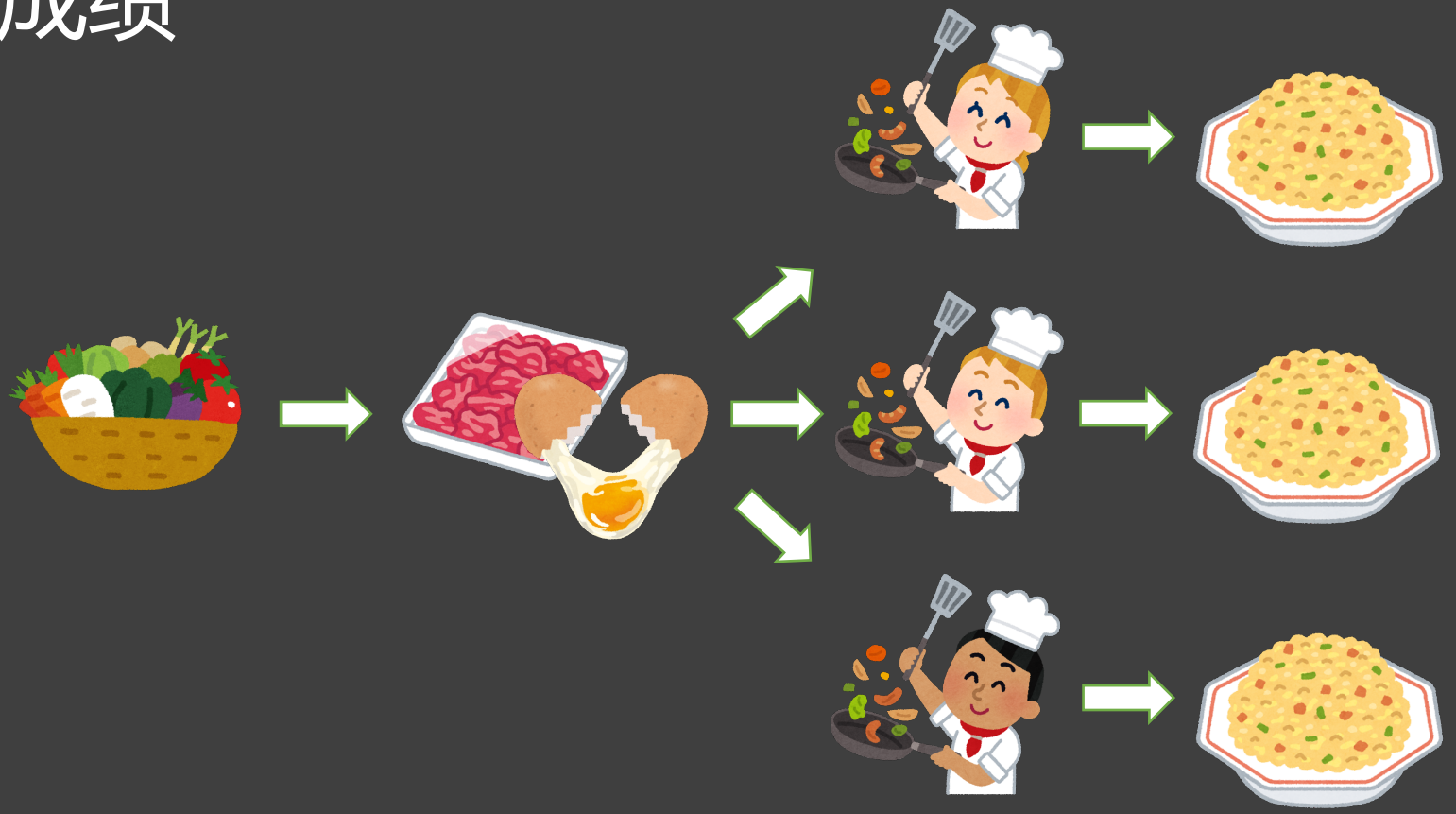
制作作业成绩的压力越来越大，OJ忙不过来了

更快的算成绩



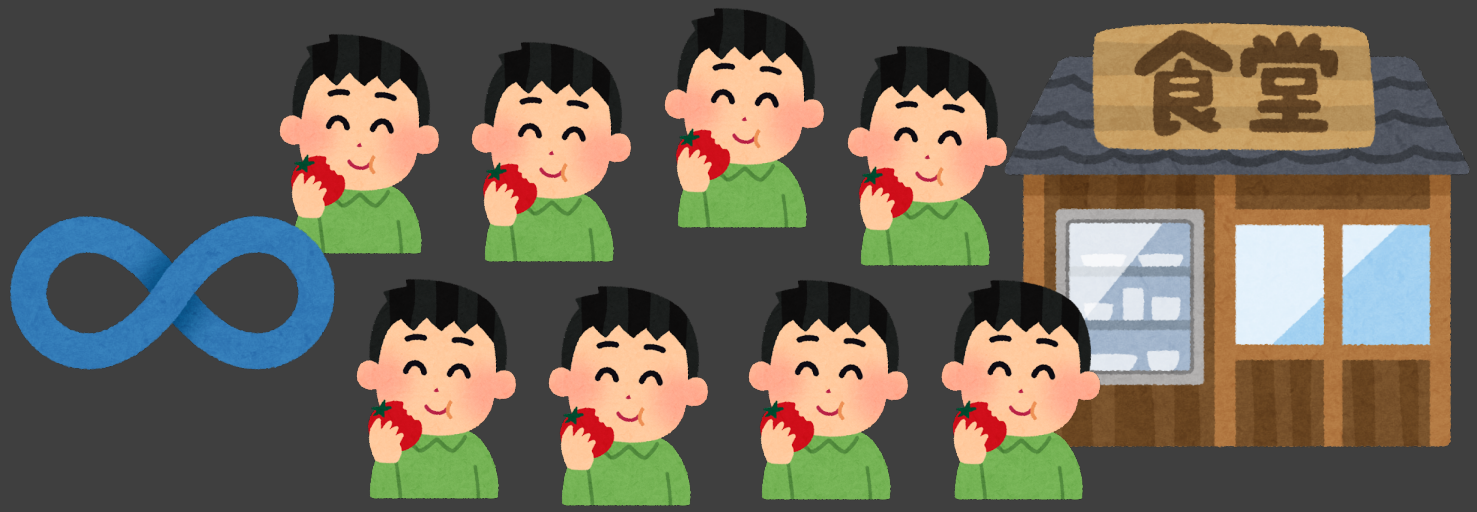
张三发现计算成绩是一个流水线的工作，可以多分几个步骤来提高效率

更快的算成绩



张三发现统计数据是流水线里最慢的步骤，可以多找几个CPU一起算

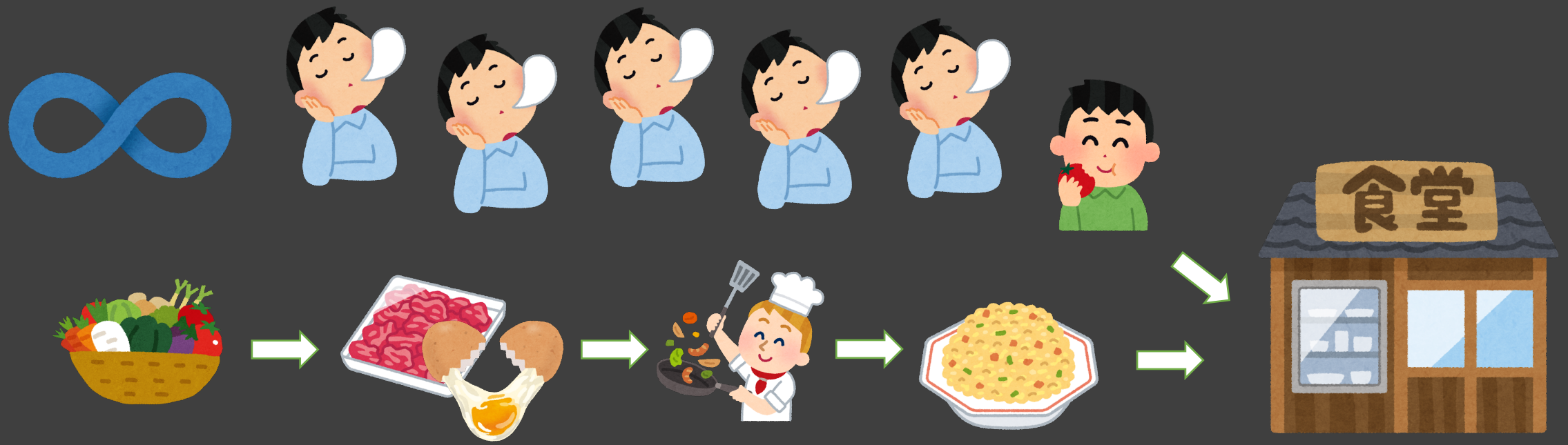
越来越多的越来越多的学生



来查成绩的学生越来越多了

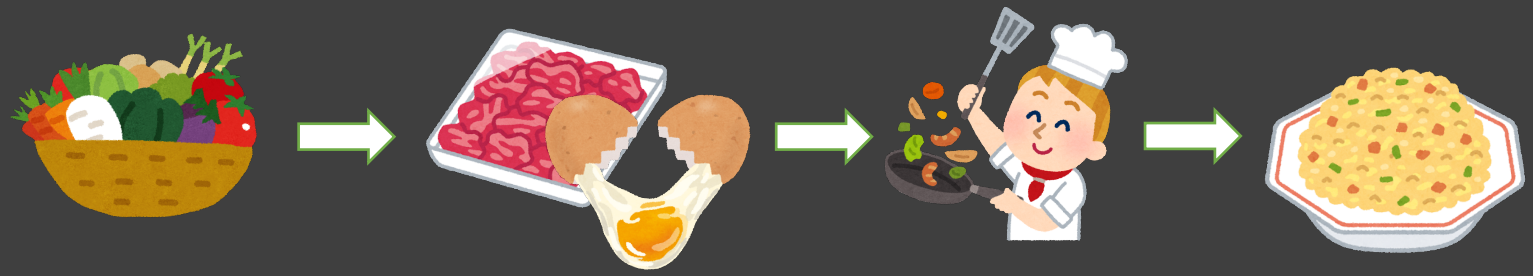
但是数据库已经要歇逼了
再大的内存也存不下这么多数据

越来越多的越来越多的学生

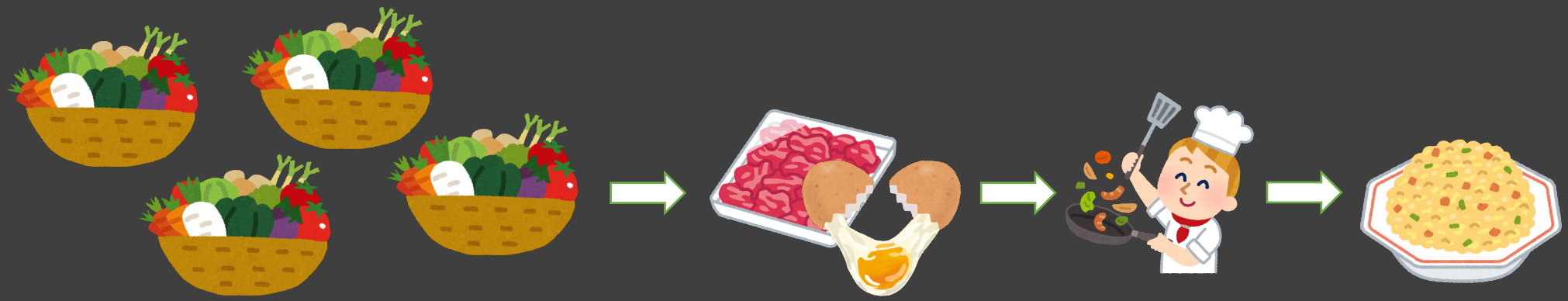


张三每从数据库获得一条数据，就算一个学生的成绩
等到数据库查找完了所有人的提交，就算完了所有人的成绩

THE END?



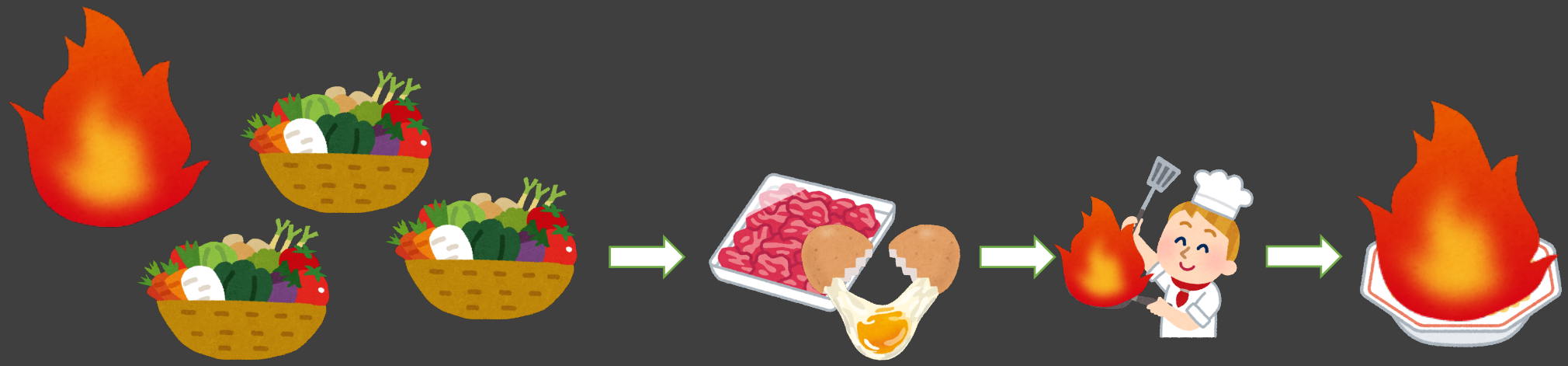
Data Mutations Data



A lot of data

Mutations

Data

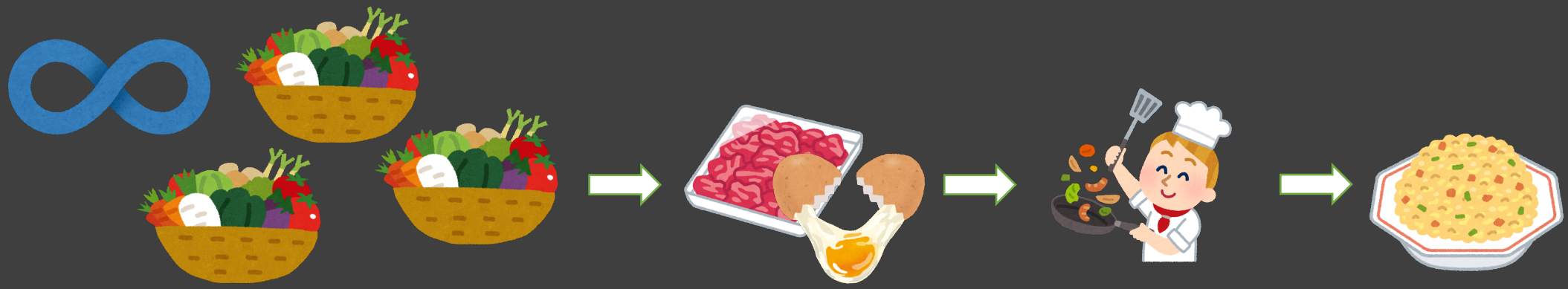


A lot of data

Mutations

Data

1. Waiting for previous stage wastes time
2. Store data consumes large memory

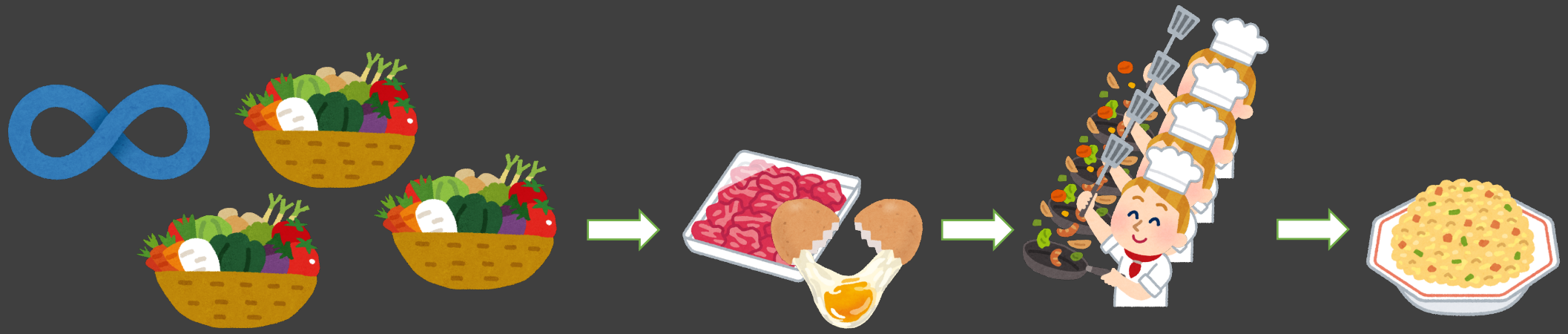


A stream of data

Pipelines

Data

Parallelization

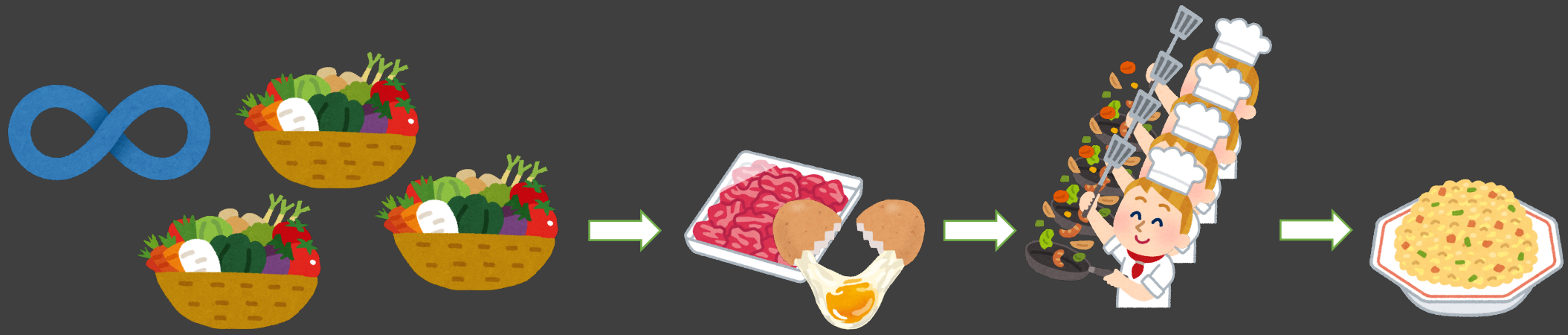


A stream of data

Pipelines

Data

Parallelization



A stream of data

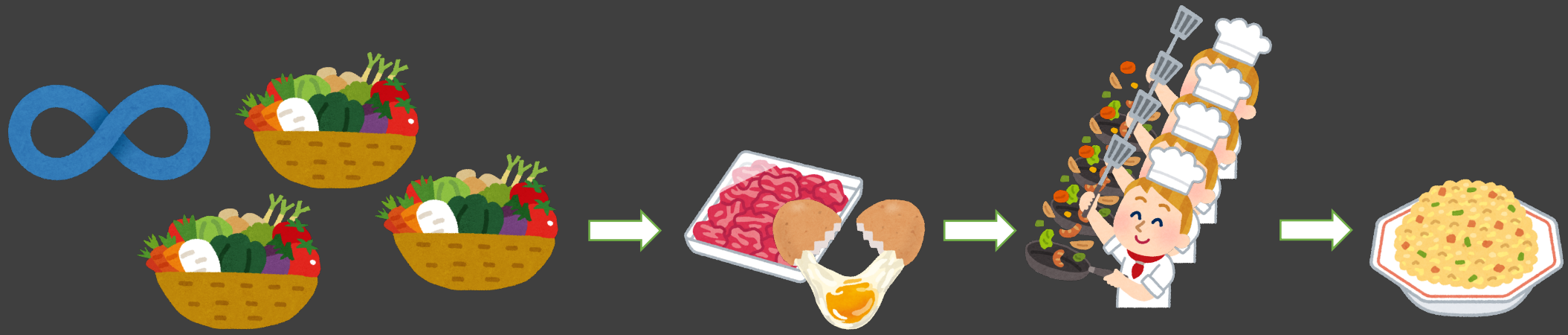
Pipelines

Data

Functional Programming:

- Use lambda expressions for pipelines
- More expressive, easy to understand (?)

Parallelization



A stream of data

Pipelines

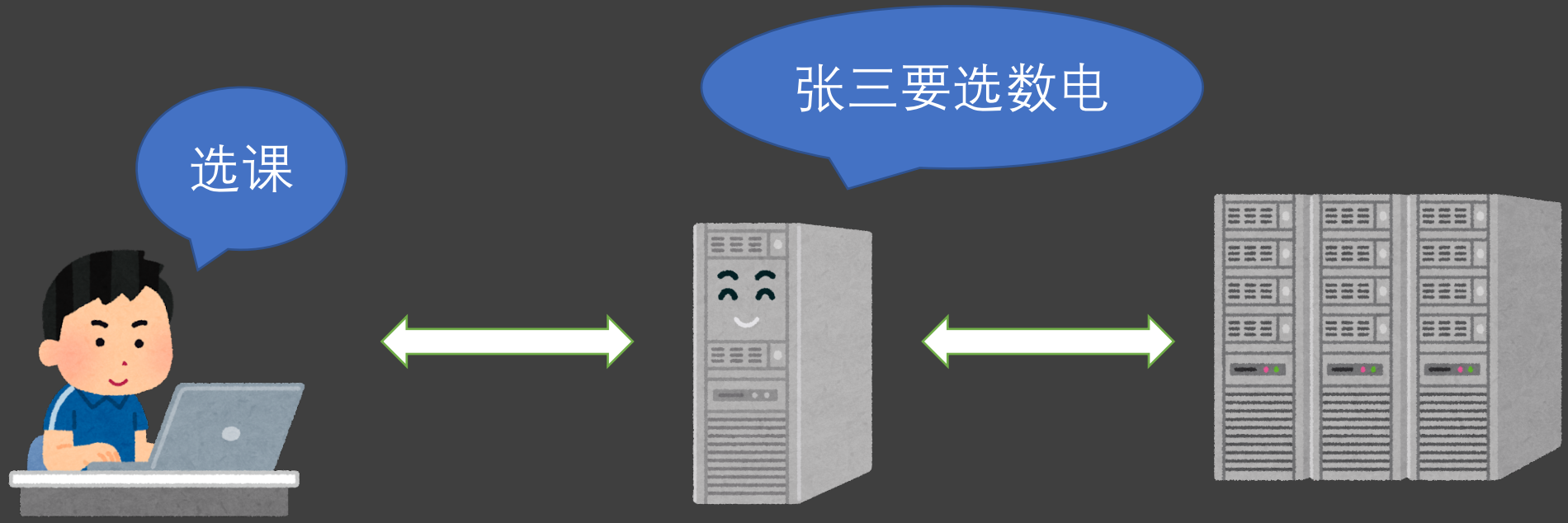
Data

Reactive Programming:

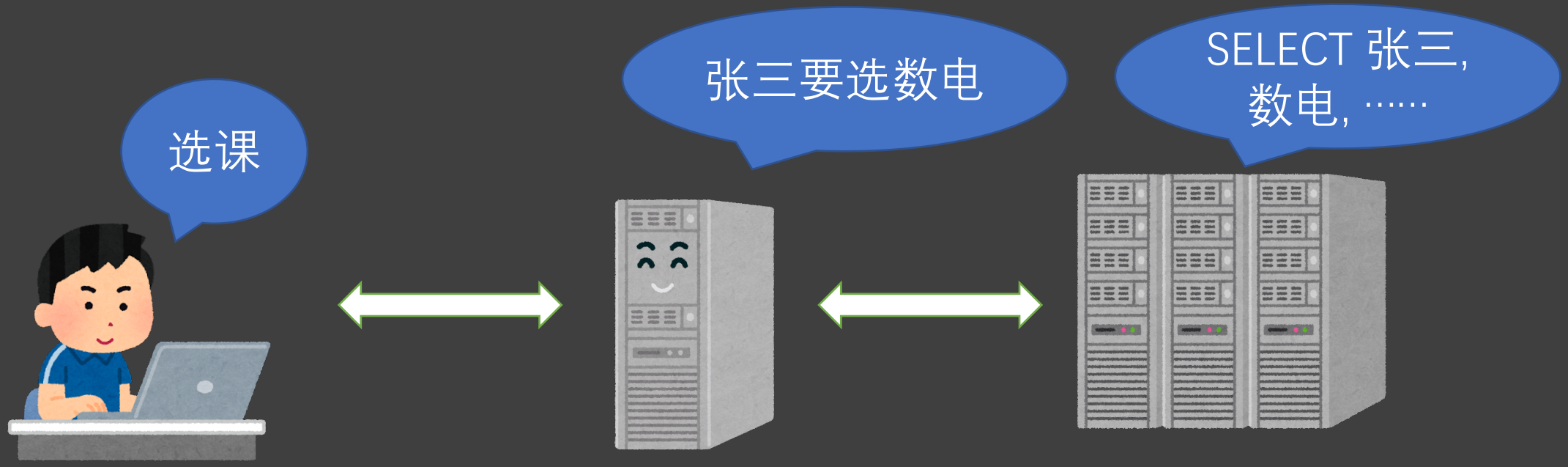
- Use pipelines to handle streams
- Non-blocking, memory-saving and fast (?)

Real World Example (?)

Real World Example (?)



Real World Example (?)



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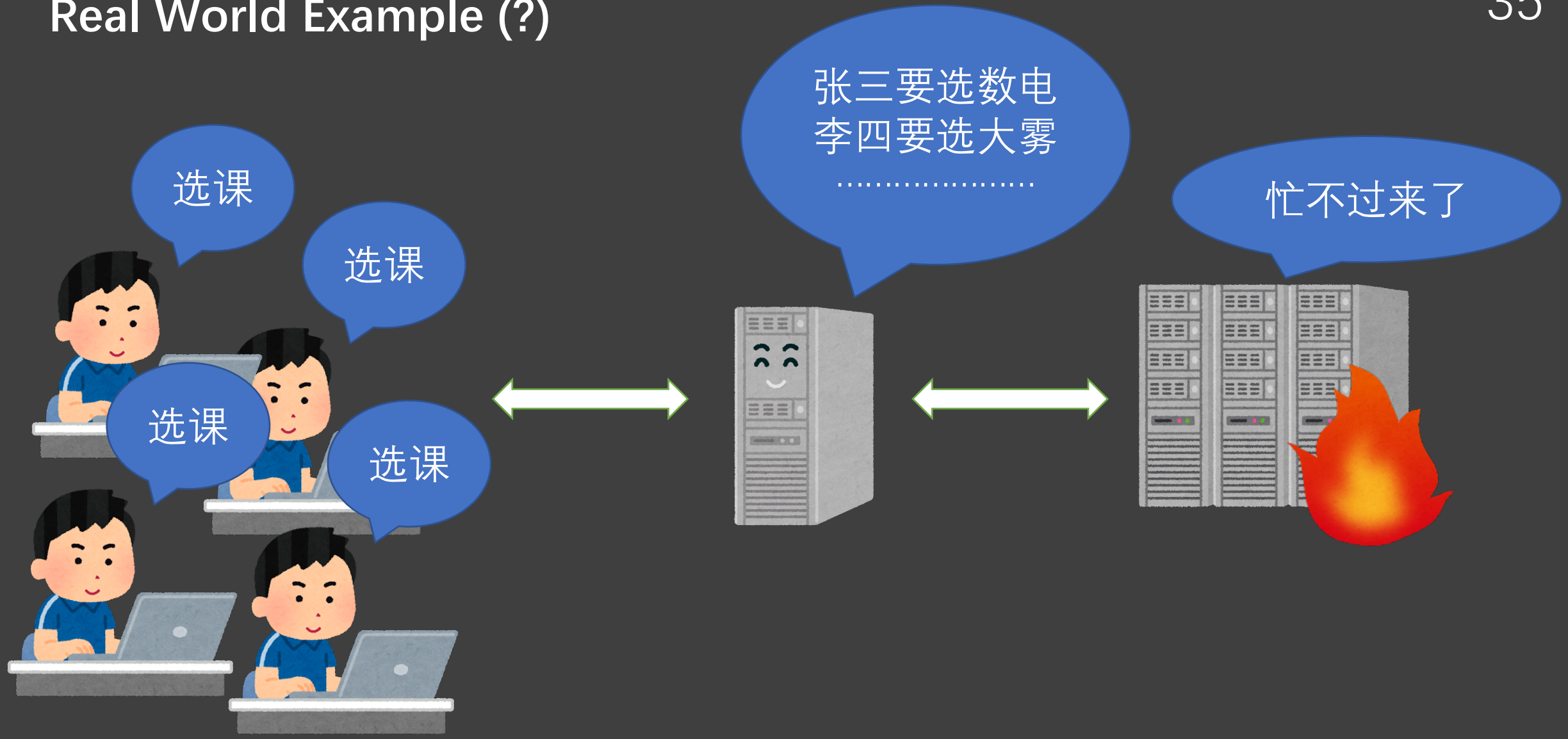

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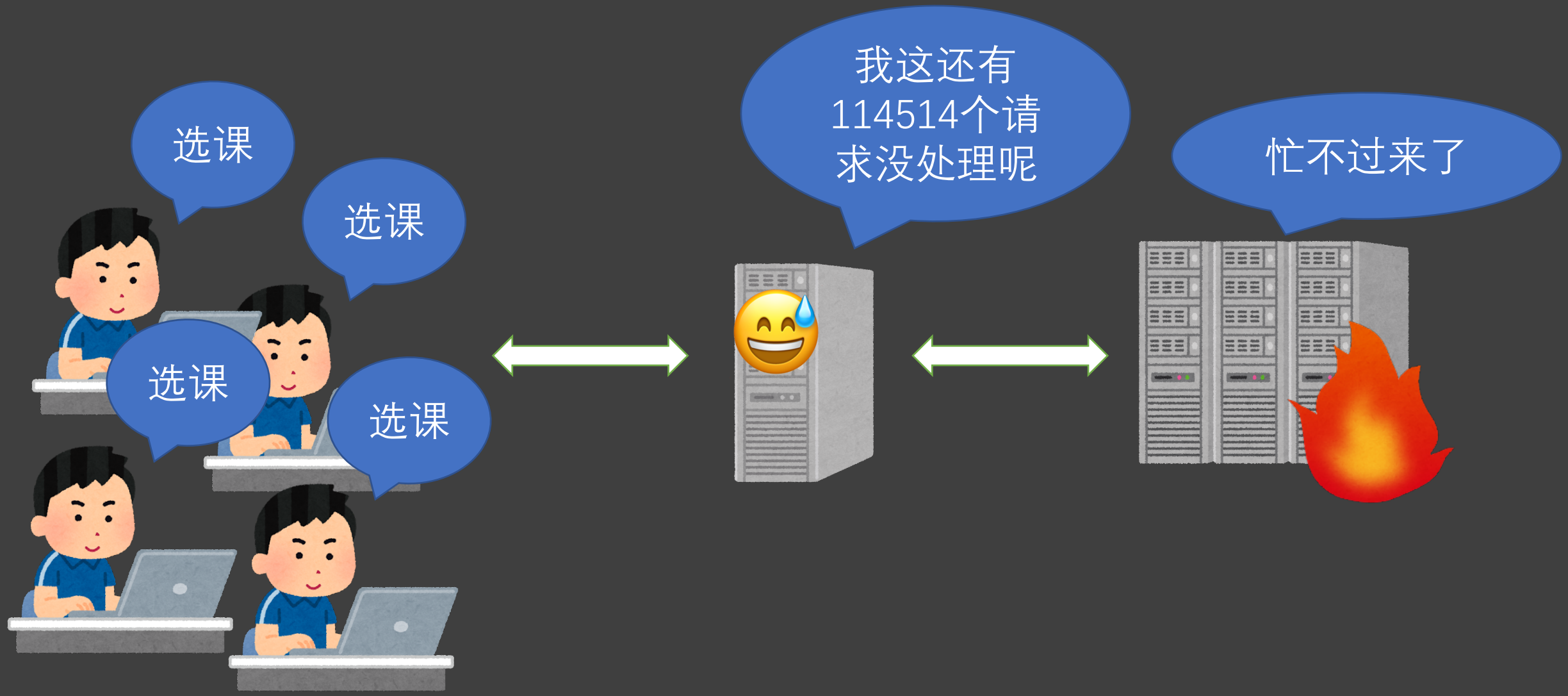

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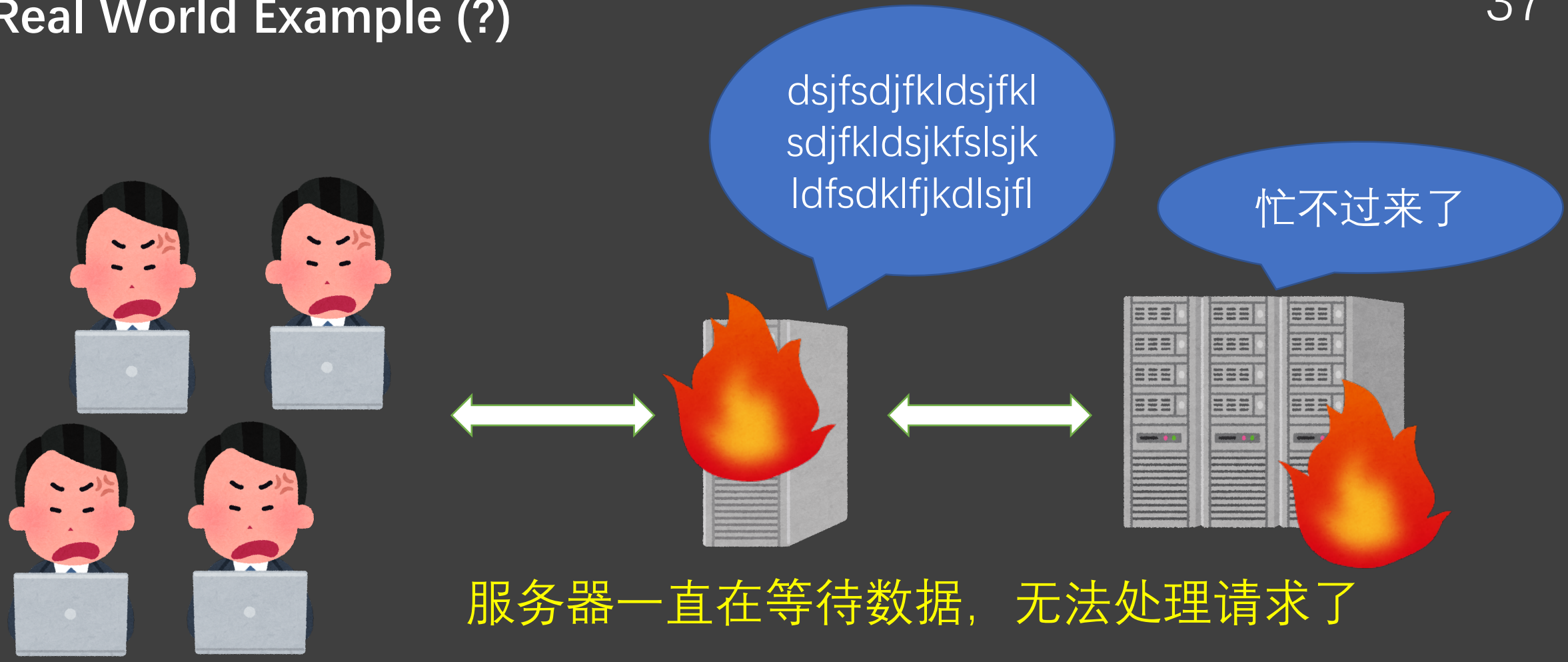
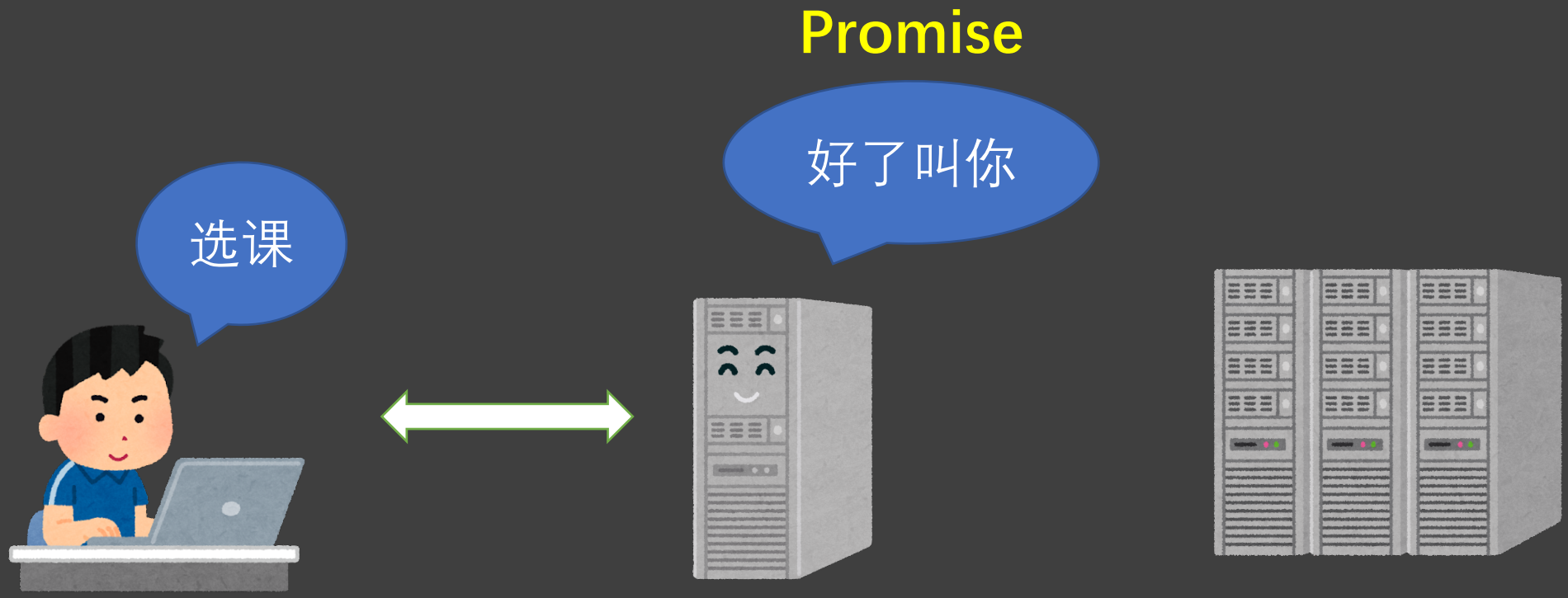


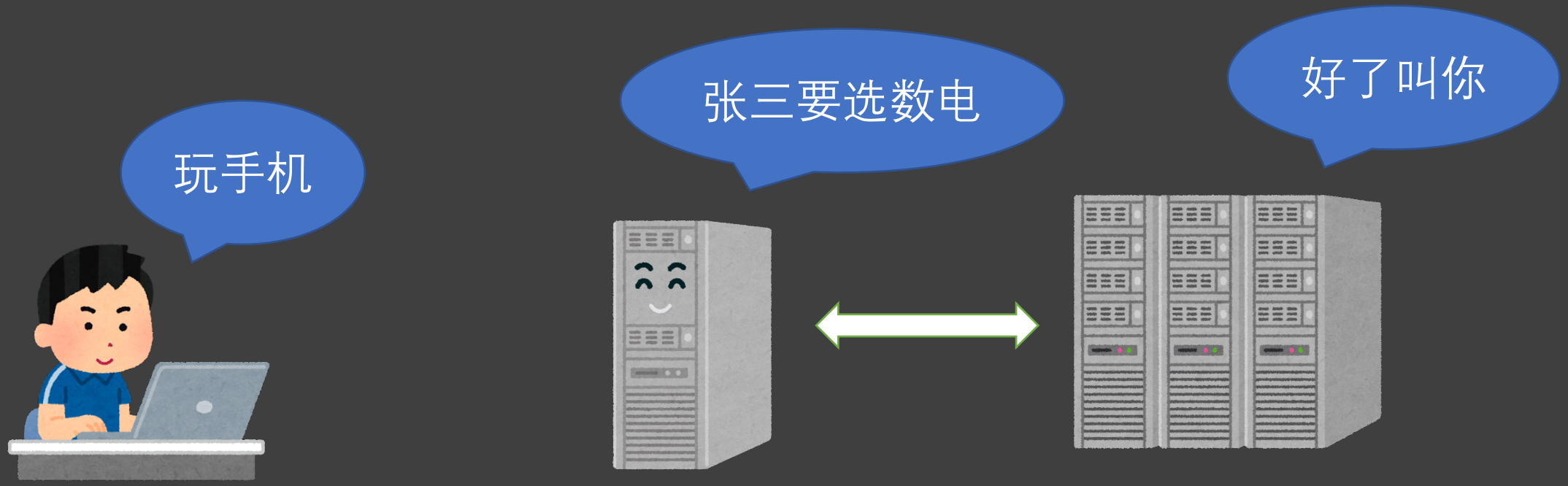
服务器一直在等待数据，无法处理请求了

Real World Example (?)

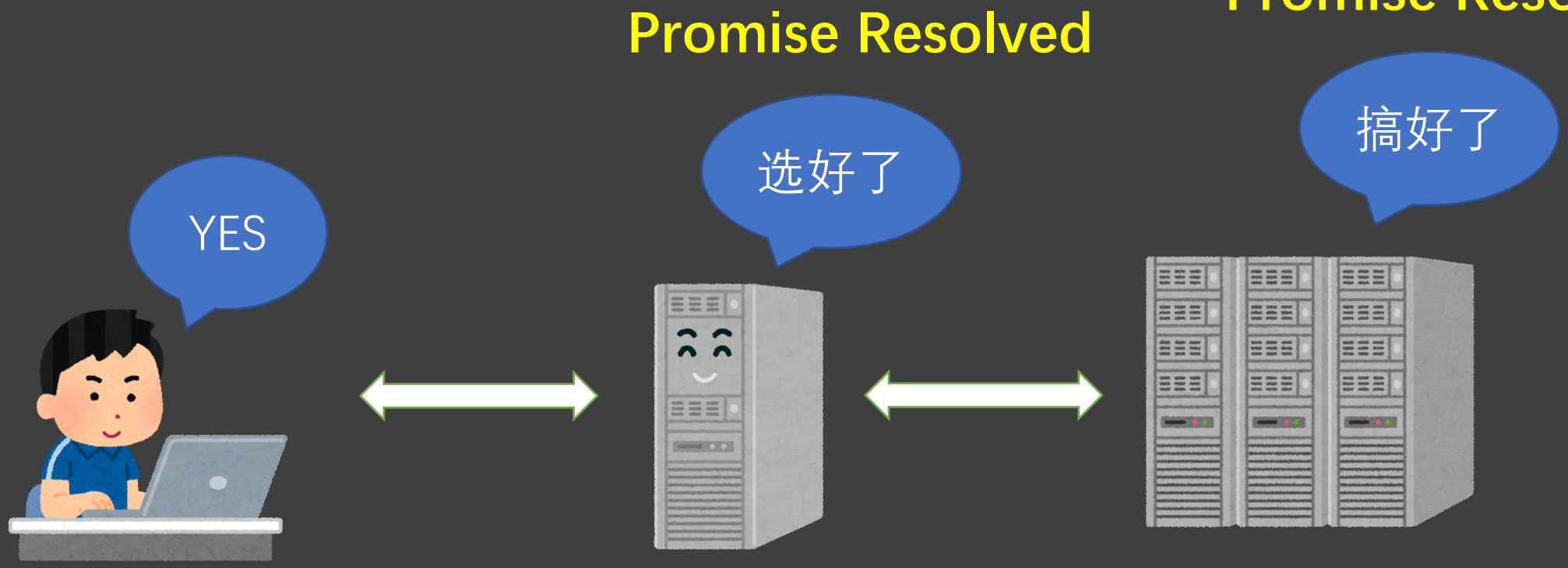


Real World Example (?)

Promise



Real World Example (?)



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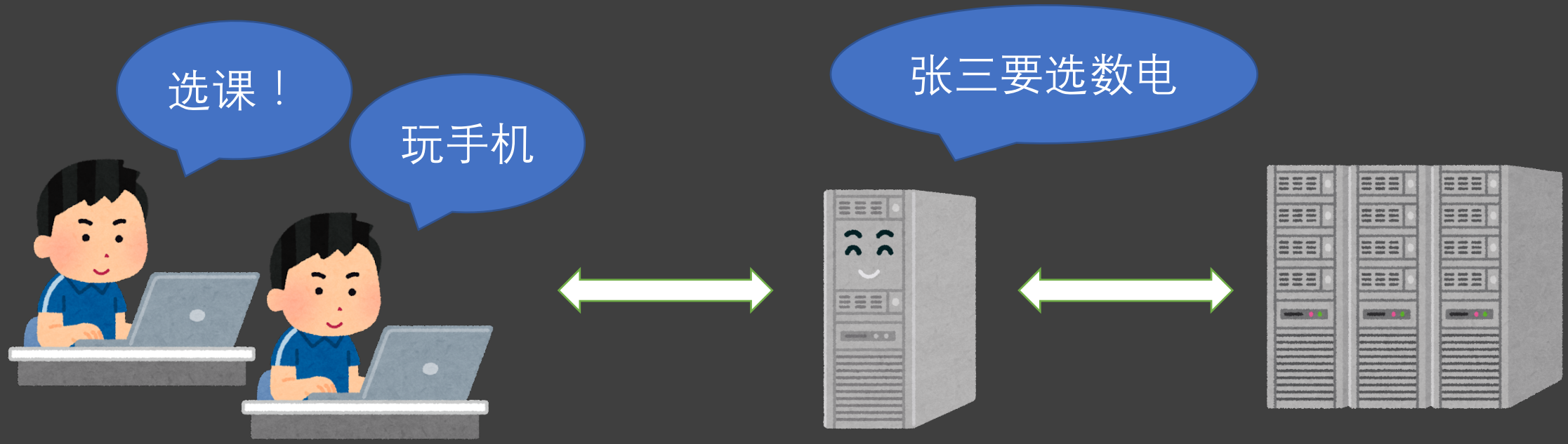

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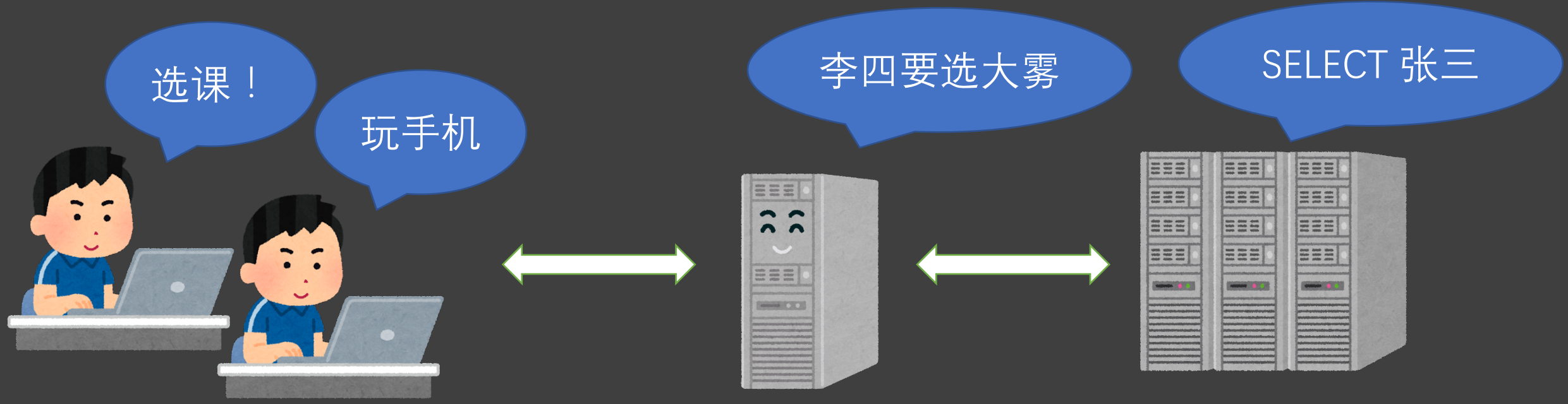

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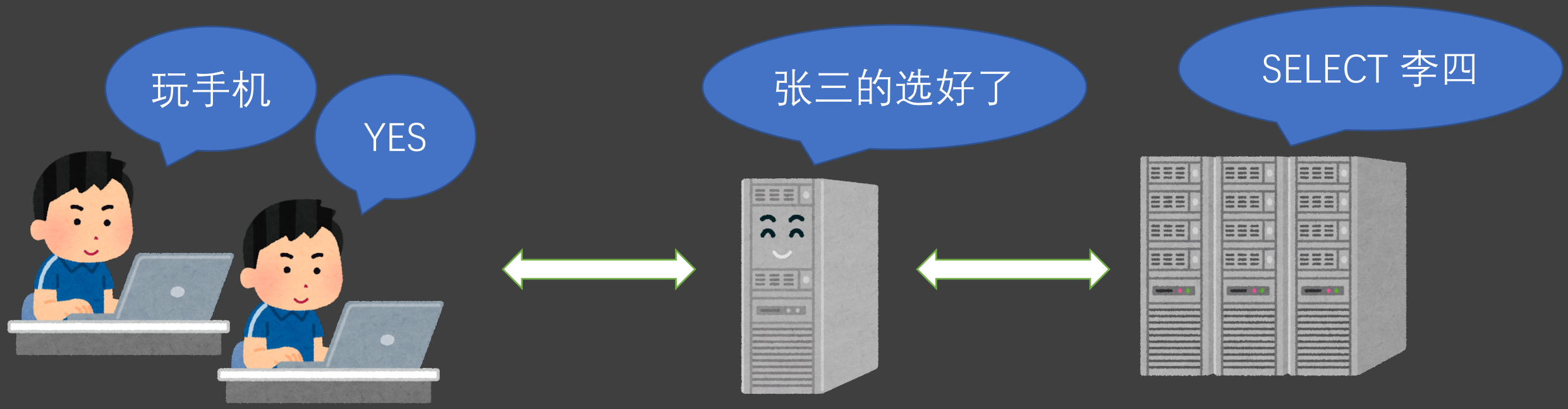

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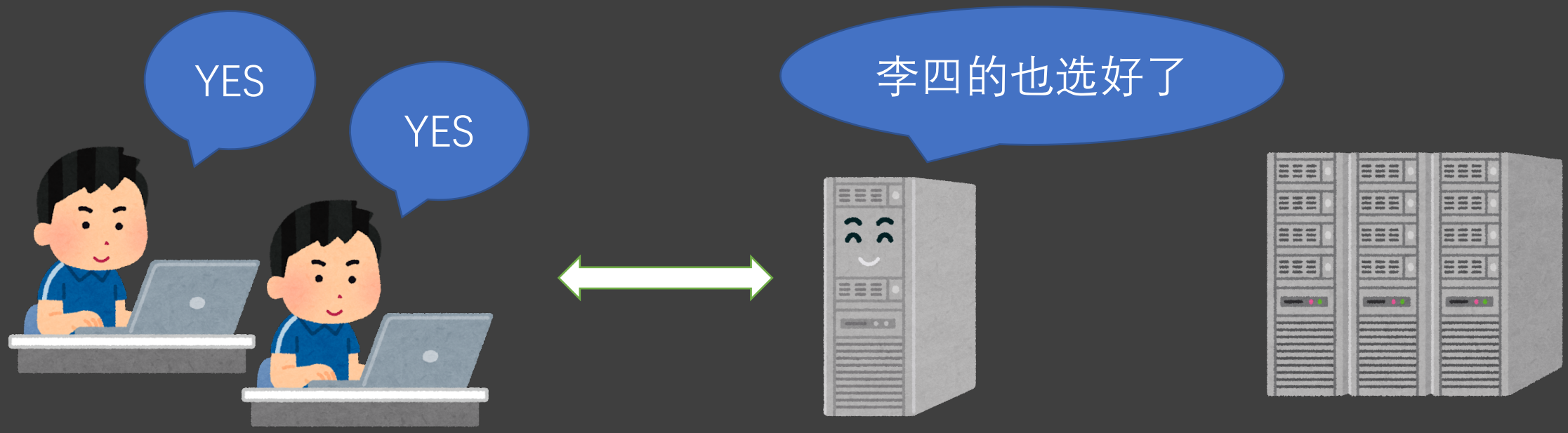

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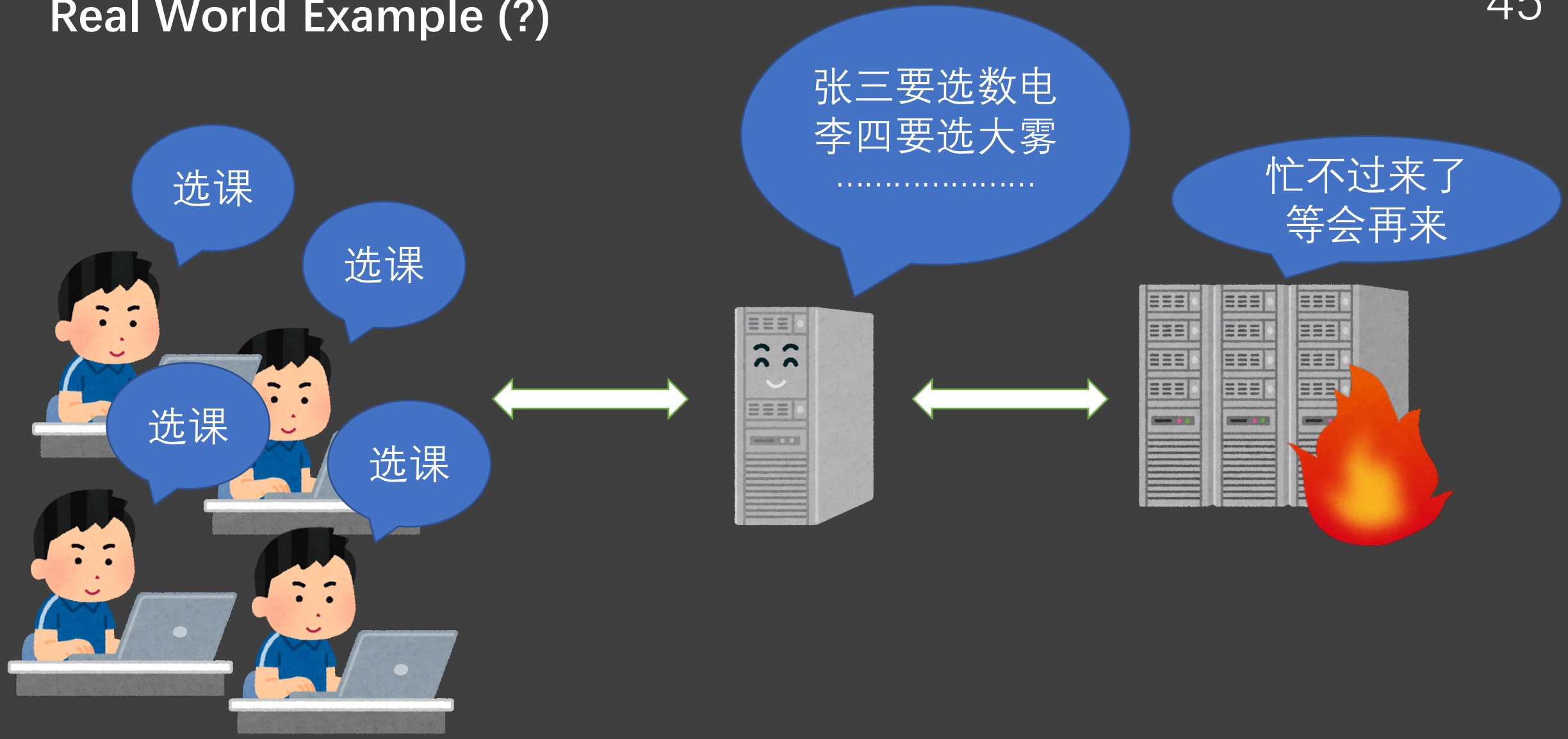

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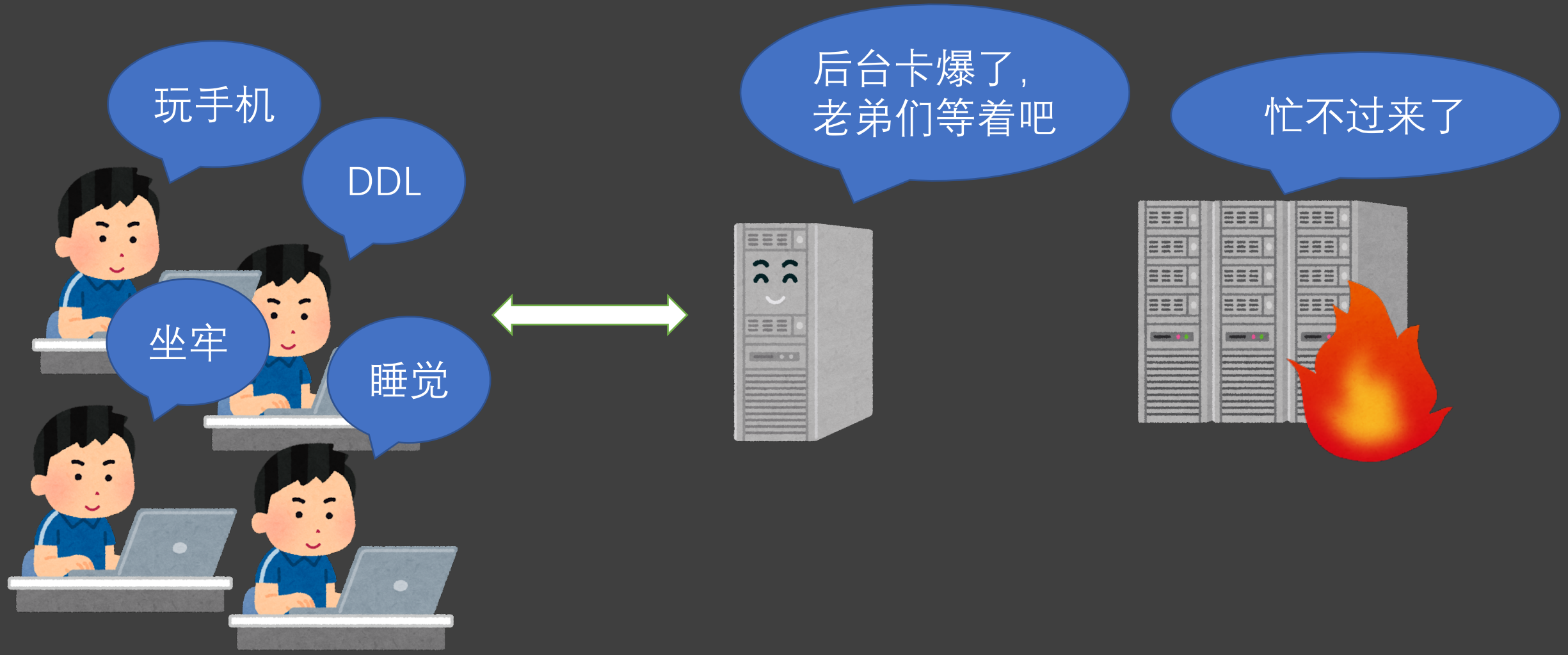

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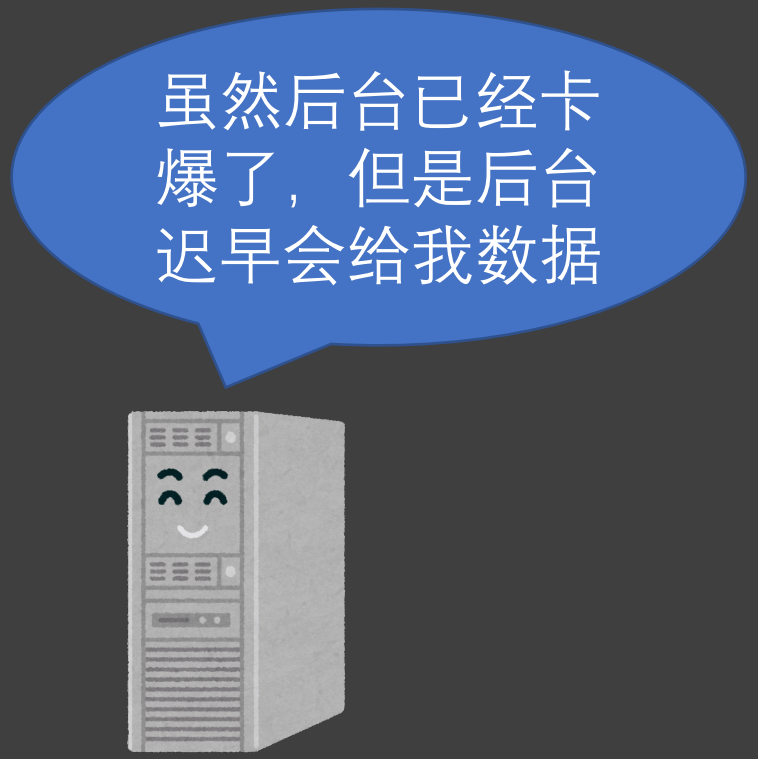
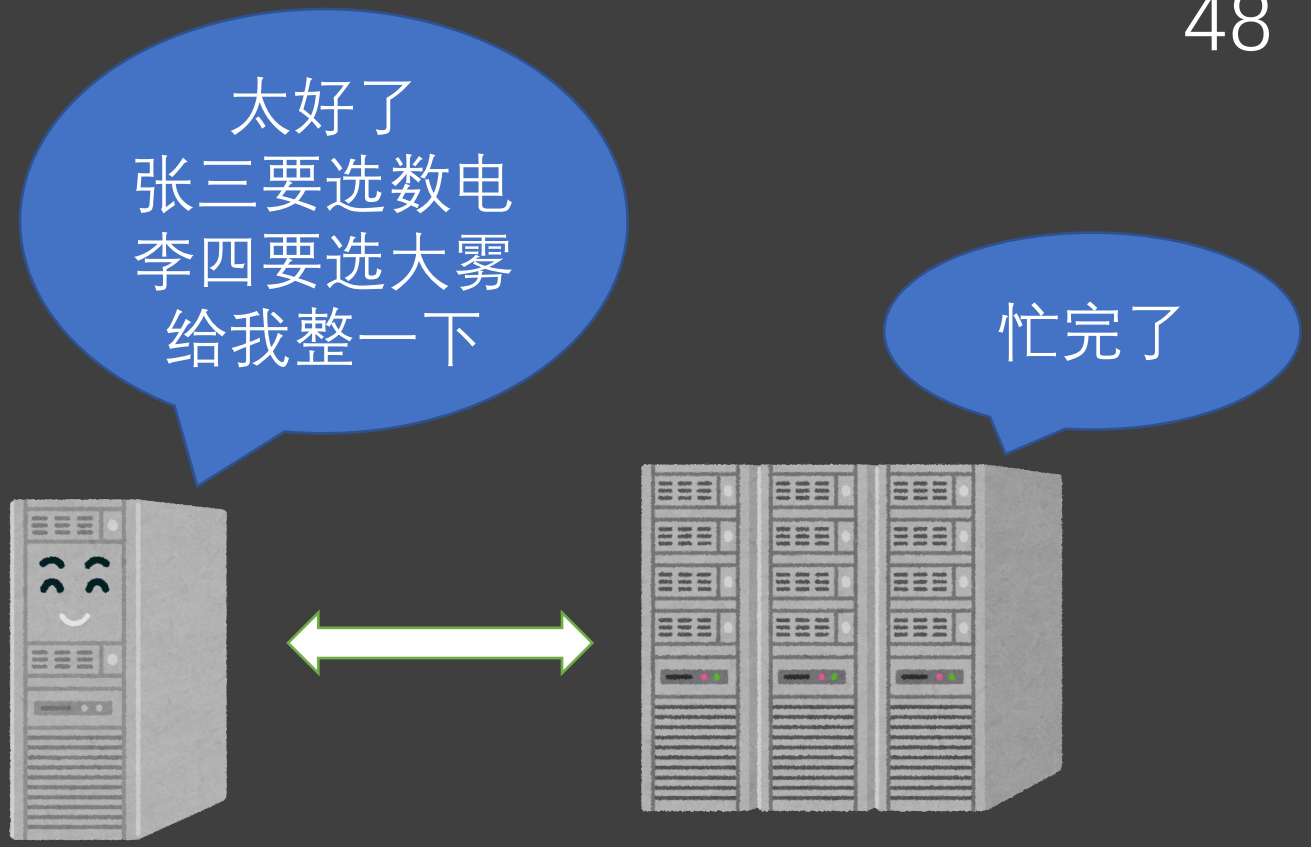


Promise

Promise

服务器保证会返回数据，但是不知道什么时候才能返回，那就等他返回再做别的步骤，我们可以先去忙别的事情

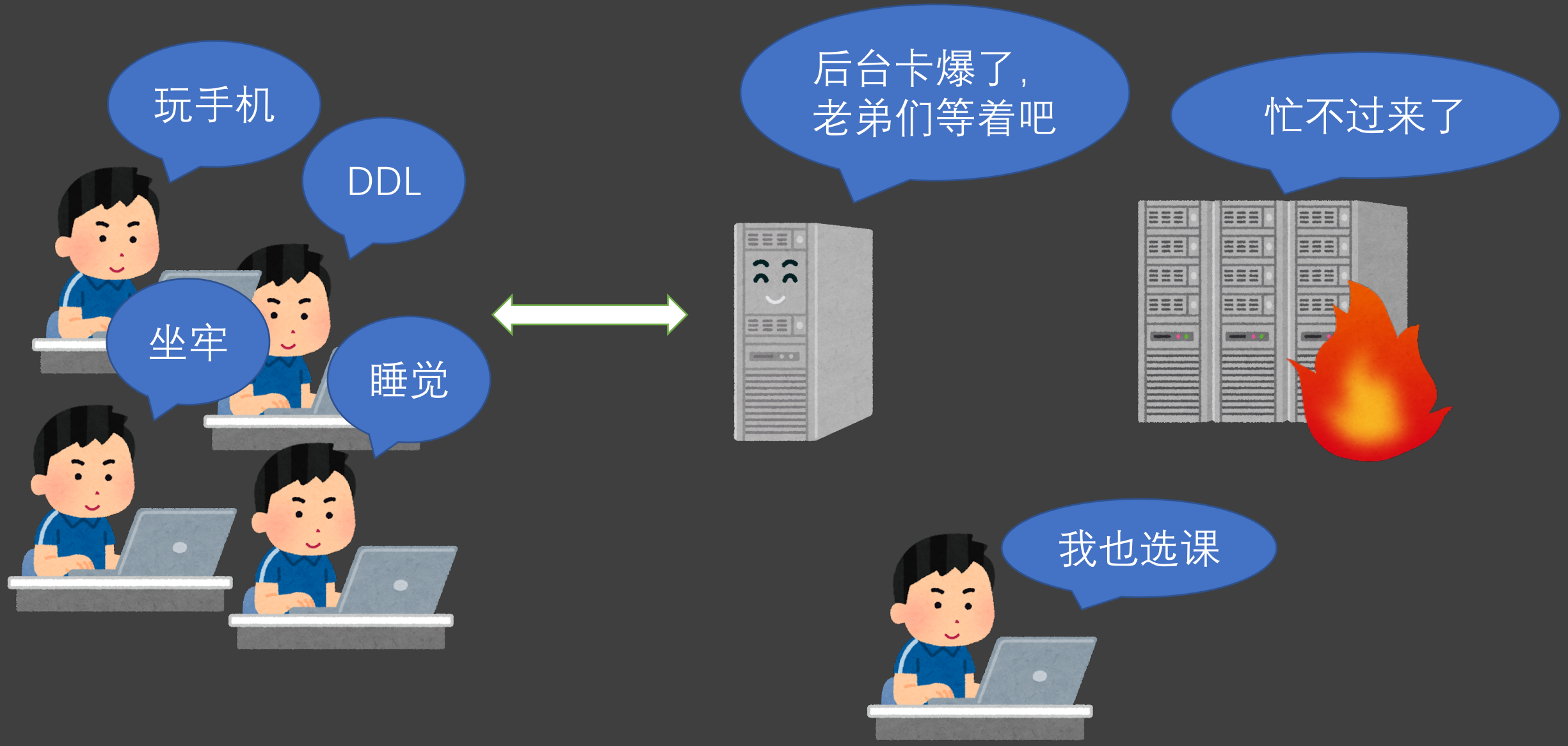
Real World Example (?)



Real World Example (?)

注：这个做法也不是万能的（下面几页）

Real World Example (?)



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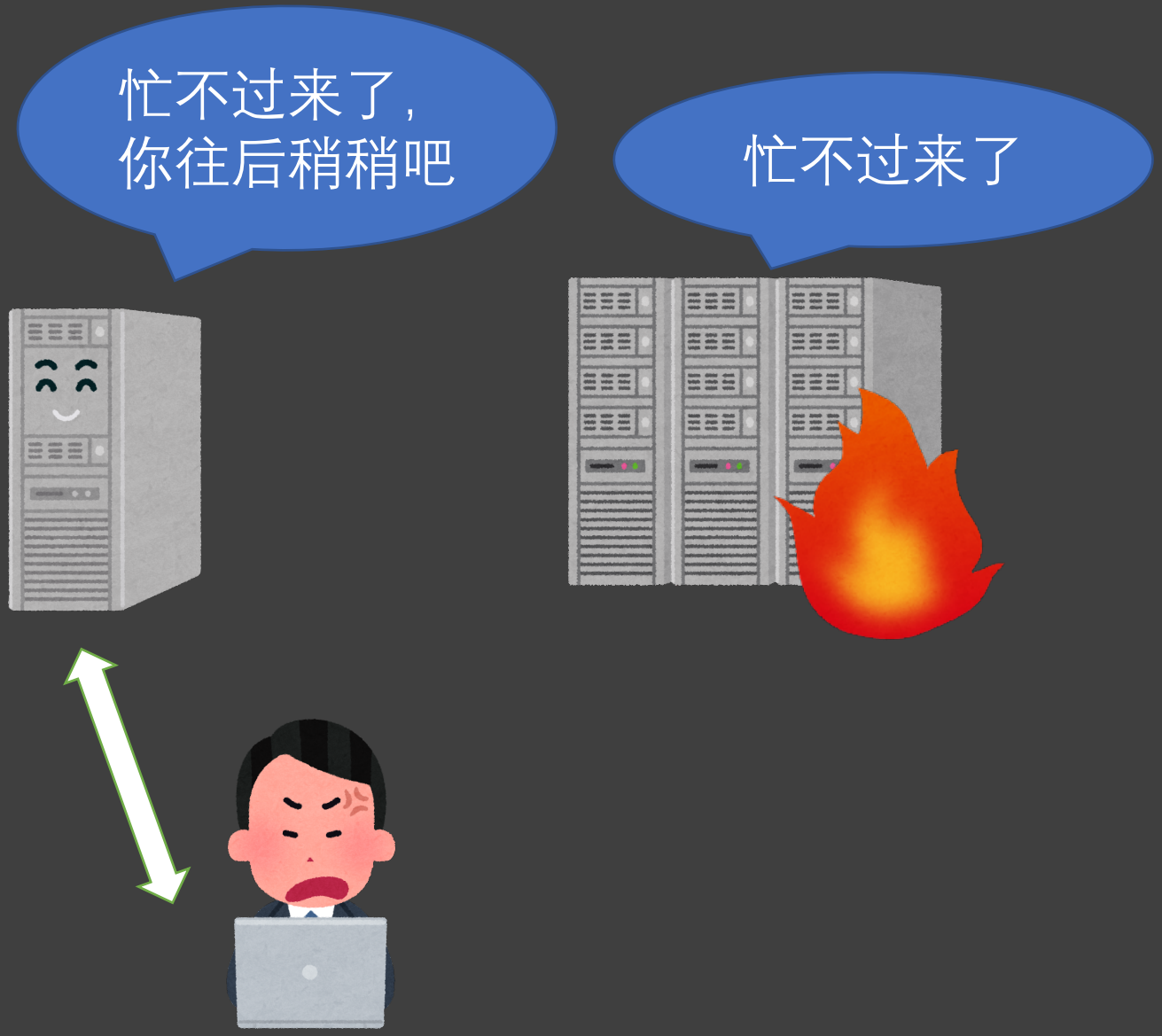

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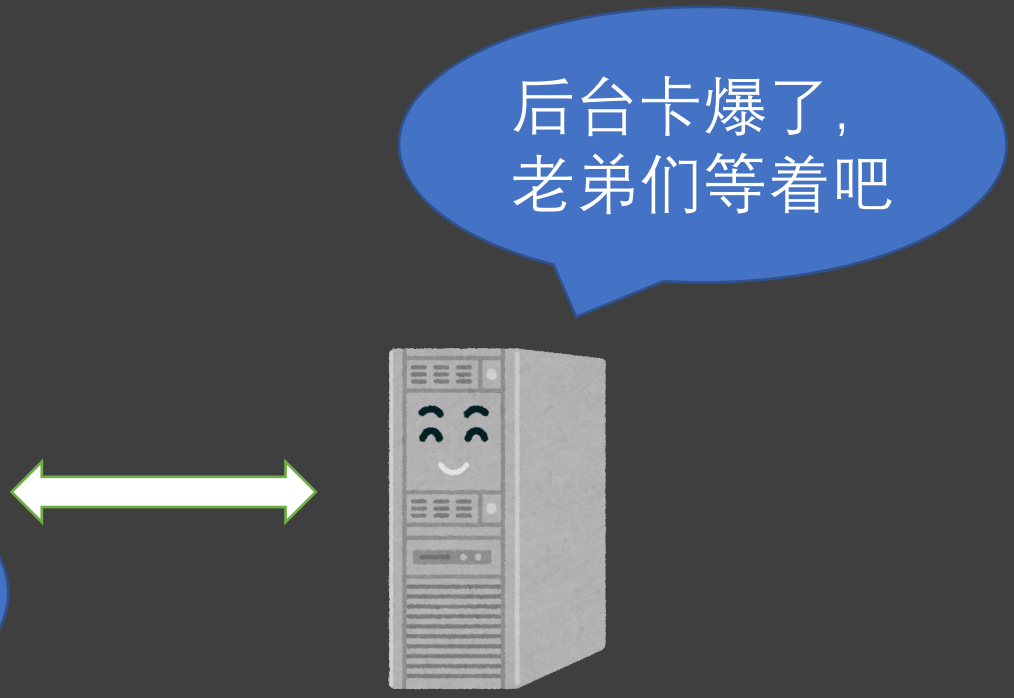

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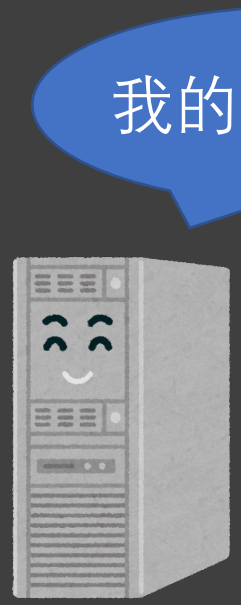


Timeout

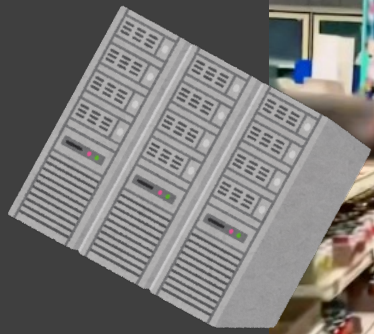
Promise Rejected

服务器可能永远等不到数据

Real World Example (?)

后台可能睡着了
老弟们改天再来吧

硬件坏了



服务器发现异常
向用户打破promise

Want to learn more?

- Functional Programming
- Continuation-passing Style
- Callbacks (Callback Hell)
- Monads & Chained Function Calls
- Promises (Future, Task, Promise)

===> ReactiveX