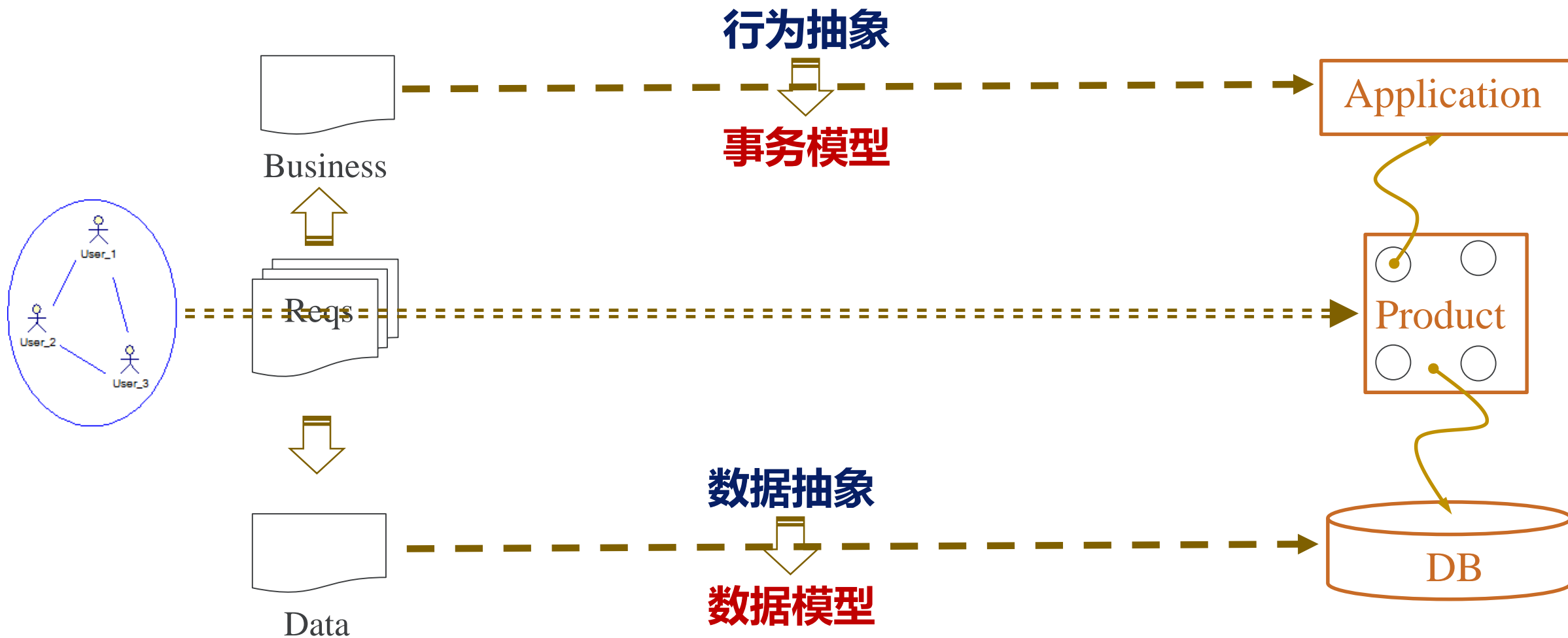


事务模型

讲解人：陆伟 教授

数据库中两个核心的概念



事务的概念

□ 事务的定义

- A transaction is the execution of a **program segment** that performs some function or task by accessing a shared database.
- An action, or **series of actions**, carried out by a single user or application program, which reads or updates the contents of the database.
- A transaction is **a logical unit** of work on the database.

| id | balance |
|-----|---------|
| 01 | 100 |
| 02 | 100 |
| ... | .. |

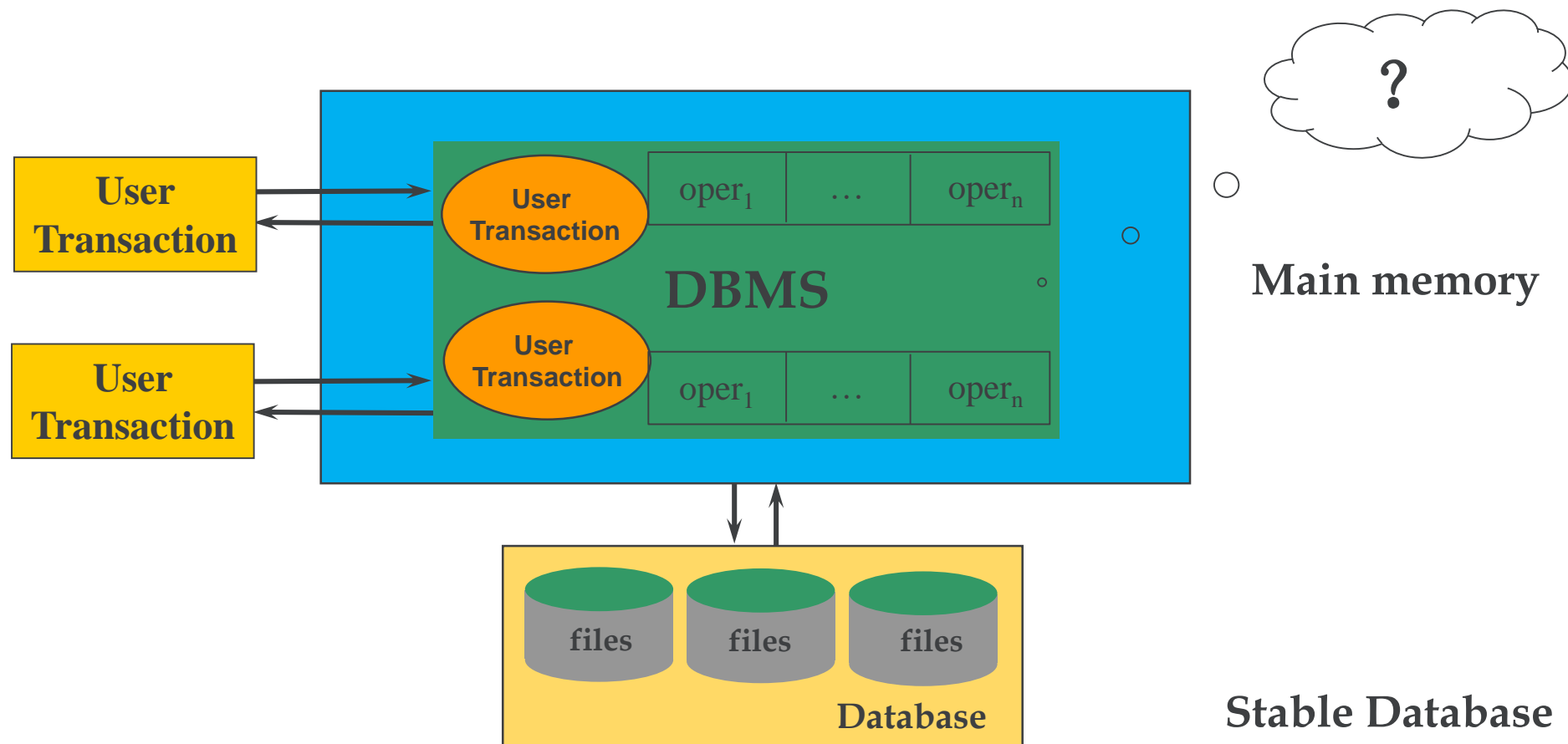
±10

```
UPDATE account
SET balance = balance - 10
WHERE id = '01';

UPDATE account
SET balance = balance + 10
WHERE id = '02';
```

oper₁ ... oper_n

事务的执行环境与潜在风险



讨论：事务执行环境对单个事务执行可能带来的风险？

事务执行环境对多个事务并发执行可能带来的风险？

DBMS对事务的支持—事务模型

- DBMS support **transaction model** to provide application programmers with a high-level execution interface that **hides** both the effects of **concurrency** among the different transactions, and the presence of **failures**.
- In this way, programmers are relieved from dealing with the complexity of concurrent programming and failures. They need only to **focus on designing the business and application logic, and developing correct individual transactions.**

| id | balance |
|-----|---------|
| 01 | 100 |
| 02 | 100 |
| ... | .. |

±10

```
UPDATE account  
SET balance = balance - 10  
WHERE id = '01';  
  
UPDATE account  
SET balance = balance + 10  
WHERE id = '02';
```

?

事务模型



事务的ACID特性

- Atomicity(原子性) → 恢复协议
 - Atomicity requires that either "all or none" of the transaction's operations be performed.
- Consistency(一致性) → 完整性约束、触发器等机制
 - Consistency requires that a transaction maintain the integrity constraints on the database.
- Isolation(隔离性) → 并发控制协议
 - Isolation requires that a transaction execute without any interference from other concurrent transactions.
- Durability(持久性) → 恢复协议
 - Durability requires that all the changes made by a committed transaction become permanent in the database, surviving any subsequent failures.

关于本讲内容



祝各位学习愉快!

感谢观看！

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