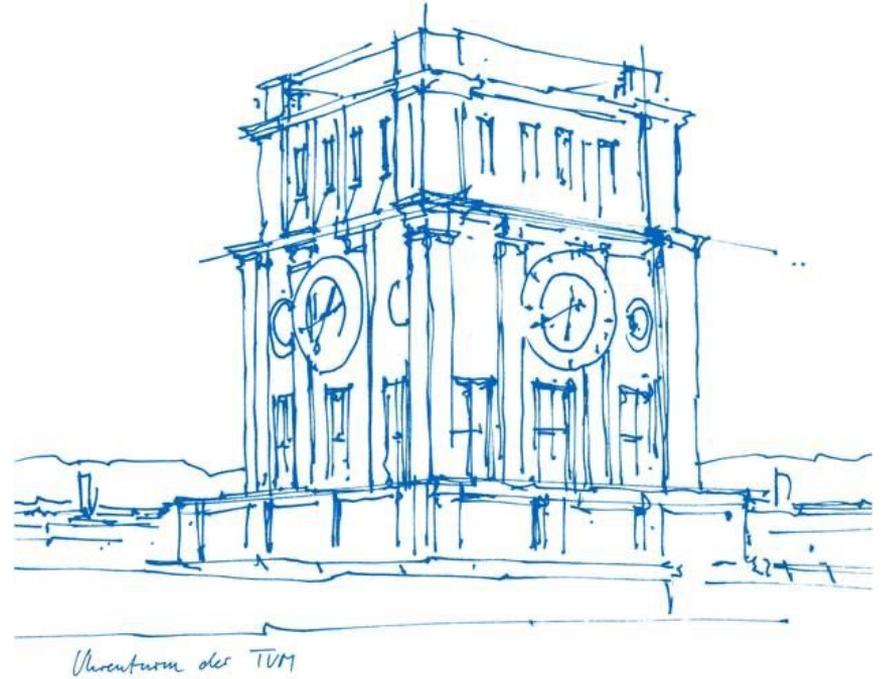


# Database Systems on Modern CPU Architectures

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Technical University of Munich

Chair for Database Systems



# Lecture Overview

Database Systems on Modern CPU Architectures

# Lecture Overview

Database Systems on Modern CPU Architectures

Database Systems **and** Modern CPU Architectures

# Lecture Overview

## **Implementation of Database Systems**

# Lecture Overview

## **Implementation of Database Systems**

(on Modern CPU Architectures)

# Lecture Overview

## Implementation of Database Systems

### 1. The Classical

#### Architecture

- 1.1. Storage
- 1.2. Access paths
- 1.3. Transactions &  
recovery

# Lecture Overview

## Implementation of Database Systems

### 1. The Classical Architecture

- 1.1. Storage
- 1.2. Access paths
- 1.3. Transactions &  
recovery

### 2. Efficient Query Processing

- 2.1. Set oriented query  
processing
- 2.2. Algebraic operators
- 2.3. Code generation

# Lecture Overview

## Implementation of Database Systems

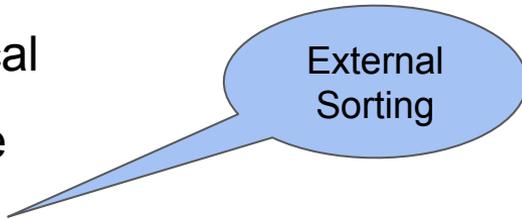
1. The Classical Architecture
  - 1.1. Storage
  - 1.2. Access paths
  - 1.3. Transactions & recovery
2. Efficient Query Processing
  - 2.1. Set oriented query processing
  - 2.2. Algebraic operators
  - 2.3. Code generation
3. Designing a DBMS for Modern Hardware
  - 3.1. Re-designing storage
  - 3.2. Optimizing cache locality
  - 3.3. Main memory databases

# Lecture Overview

## Implementation of Database Systems

### 1. The Classical Architecture

- 1.1. Storage
- 1.2. Access paths
- 1.3. Transactions &  
recovery



External  
Sorting

# Lecture Overview

## Implementation of Database Systems

### 1. The Classical Architecture

- 1.1. Storage
- 1.2. Access paths
- 1.3. Transactions &  
recovery

External  
Sorting

The diagram consists of two blue speech bubbles. The top bubble is connected to the 'Storage' item in the list above. The bottom bubble is also connected to the 'Storage' item. The bubbles contain the text 'External Sorting' and 'Buffer Manager' respectively.

Buffer  
Manager

# Lecture Overview

## Implementation of Database Systems

### 1. The Classical Architecture

1.1. Storage

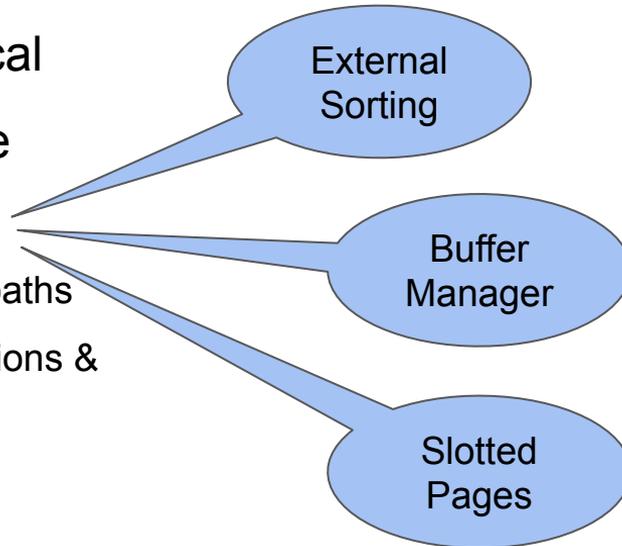
1.2. Access paths

1.3. Transactions &  
recovery

External  
Sorting

Buffer  
Manager

Slotted  
Pages

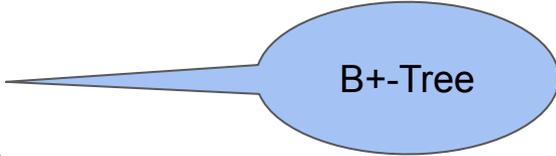


# Lecture Overview

## Implementation of Database Systems

### 1. The Classical Architecture

- 1.1. Storage
- 1.2. Access paths
- 1.3. Transactions &  
recovery



B+-Tree

# Lecture Overview

## Implementation of Database Systems

### 1. The Classical Architecture

- 1.1. Storage
- 1.2. Access paths
- 1.3. Transactions & recovery

### 2. Efficient Query Processing

- 2.1. Set oriented query processing
- 2.2. Algebraic operators
- 2.3. Code generation



# Lecture Overview

## Implementation of Database Systems

1. The Classical Architecture
  - 1.1. Storage
  - 1.2. Access paths
  - 1.3. Transactions & recovery
2. Efficient Query Processing
  - 2.1. Set oriented query processing
  - 2.2. Algebraic operators
  - 2.3. Code generation
3. Designing a DBMS for Modern Hardware
  - 3.1. Re-designing storage
  - 3.2. Optimizing cache locality
  - 3.3. Main memory databases

# Exercises

- Sessions: Tuesdays 15:30 – 17:00
- Programming assignments every 2 weeks, starting today
- Announcements on website & **Mattermost**
- Implementation assignment tasks on **GitLab**
  - Submit via git
  - Due two weeks later, Tuesdays @15:30
- No Teams. We will check for copied code!
- Bonus System:
  - .3/.4 grade bonus on final exam ( $\geq 5\%$  exercises passed)
  - Passed: Green GitLab **CI** (build, lint, test)
  - Fail: CI pipeline failed, skipped/disabled tests

# GitLab & Mattermost

- Register: <https://gitlab.db.in.tum.de/>
- Join Group: <https://gitlab.db.in.tum.de/moderndbs-2023>
- Fork first task External Sort
- Clone & Push your solution
- Announcements / Questions:  
<https://mattermost.db.in.tum.de/moderndbs23>