

Welcome to CCT395!

Special Topics in CCIT: Databases

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University of Toronto

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What is a “Database”?

“an organized collection of data”



Alice



information



Bob



Alice



information



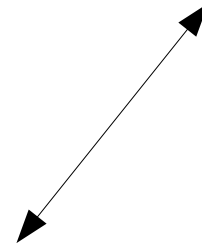
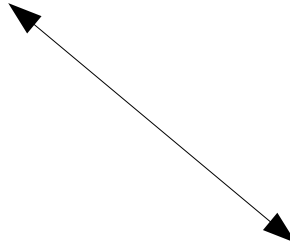
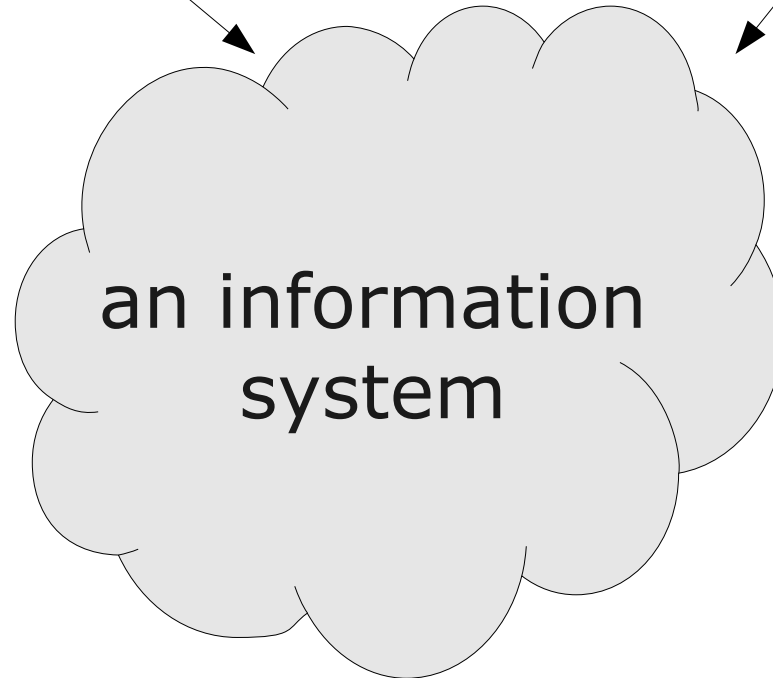
Bob



Alice

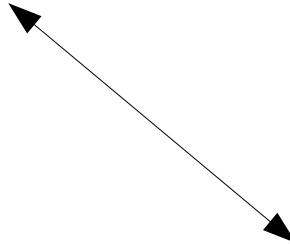


Bob

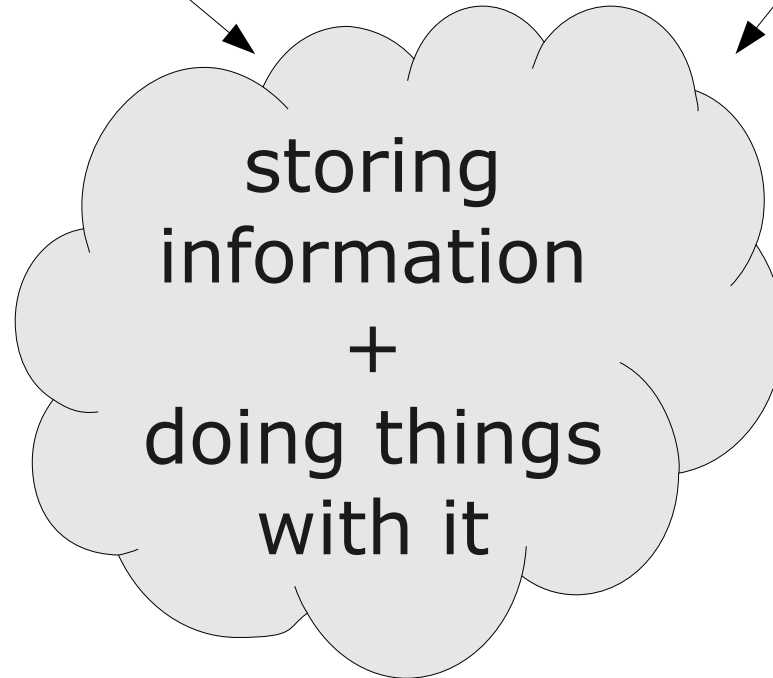
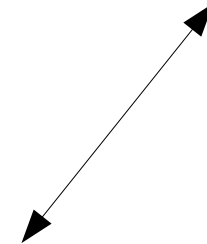




Alice

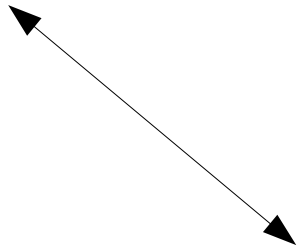


Bob

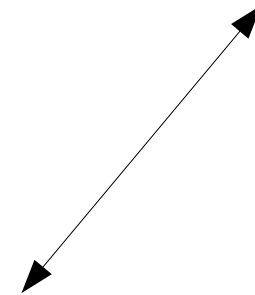




Alice

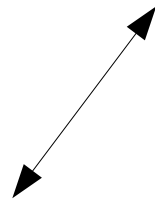


Bob



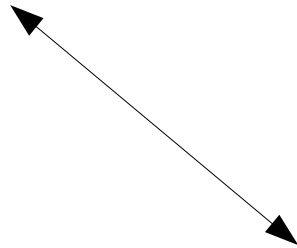
application software

database

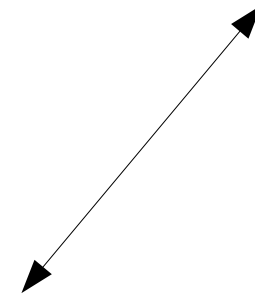




Alice



Bob

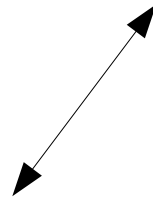


application software



database

"persistent storage"





Alice

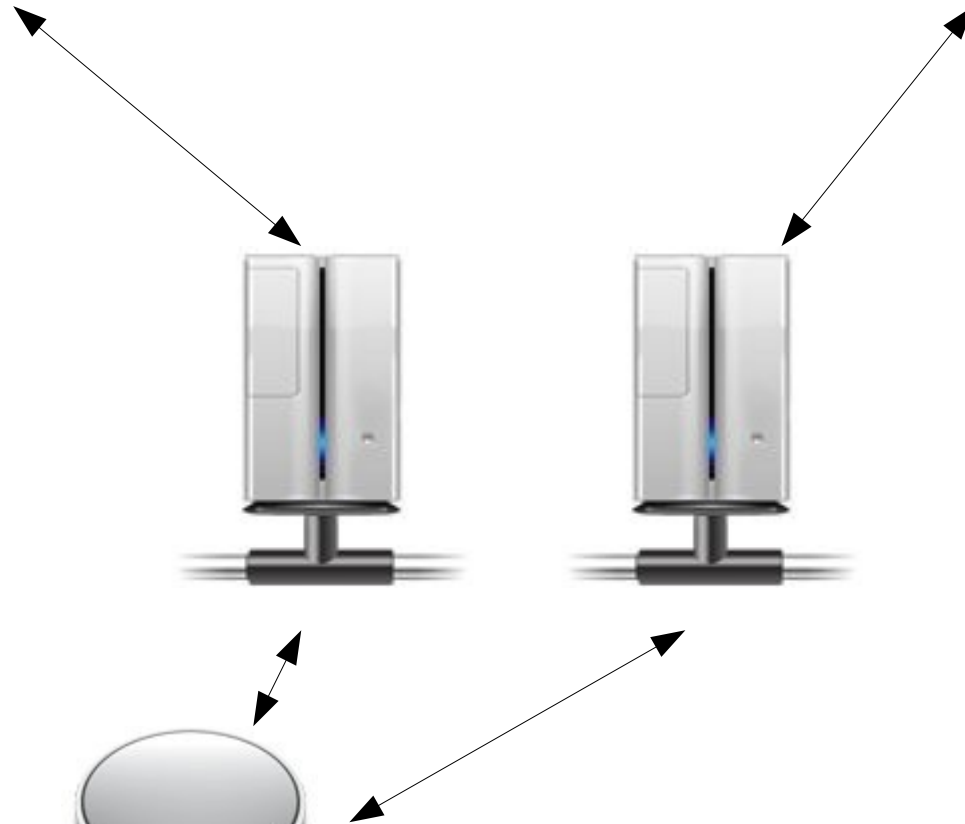


Bob



database

"persistent storage"





require a way
of *finding* the
record

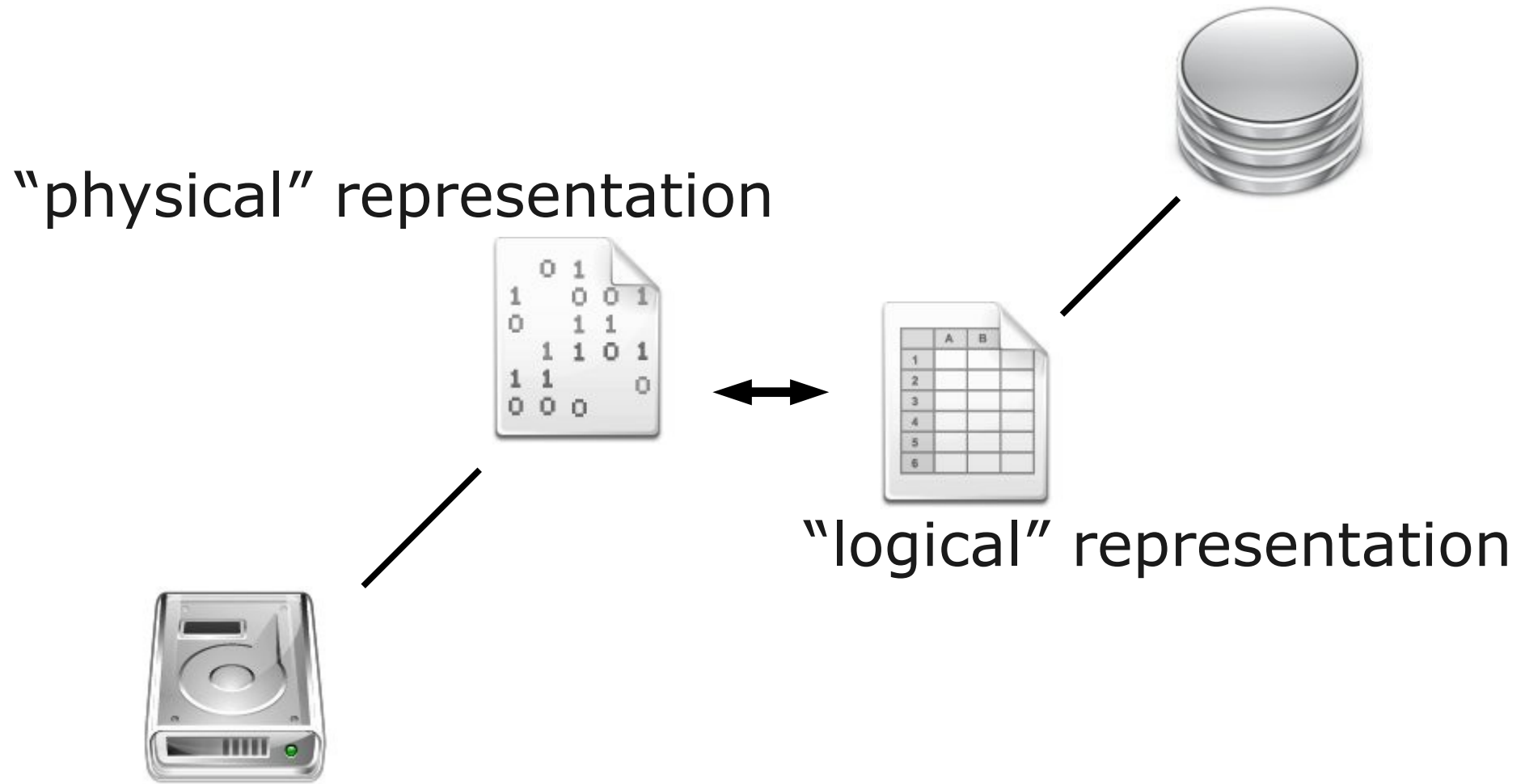
Create

Read

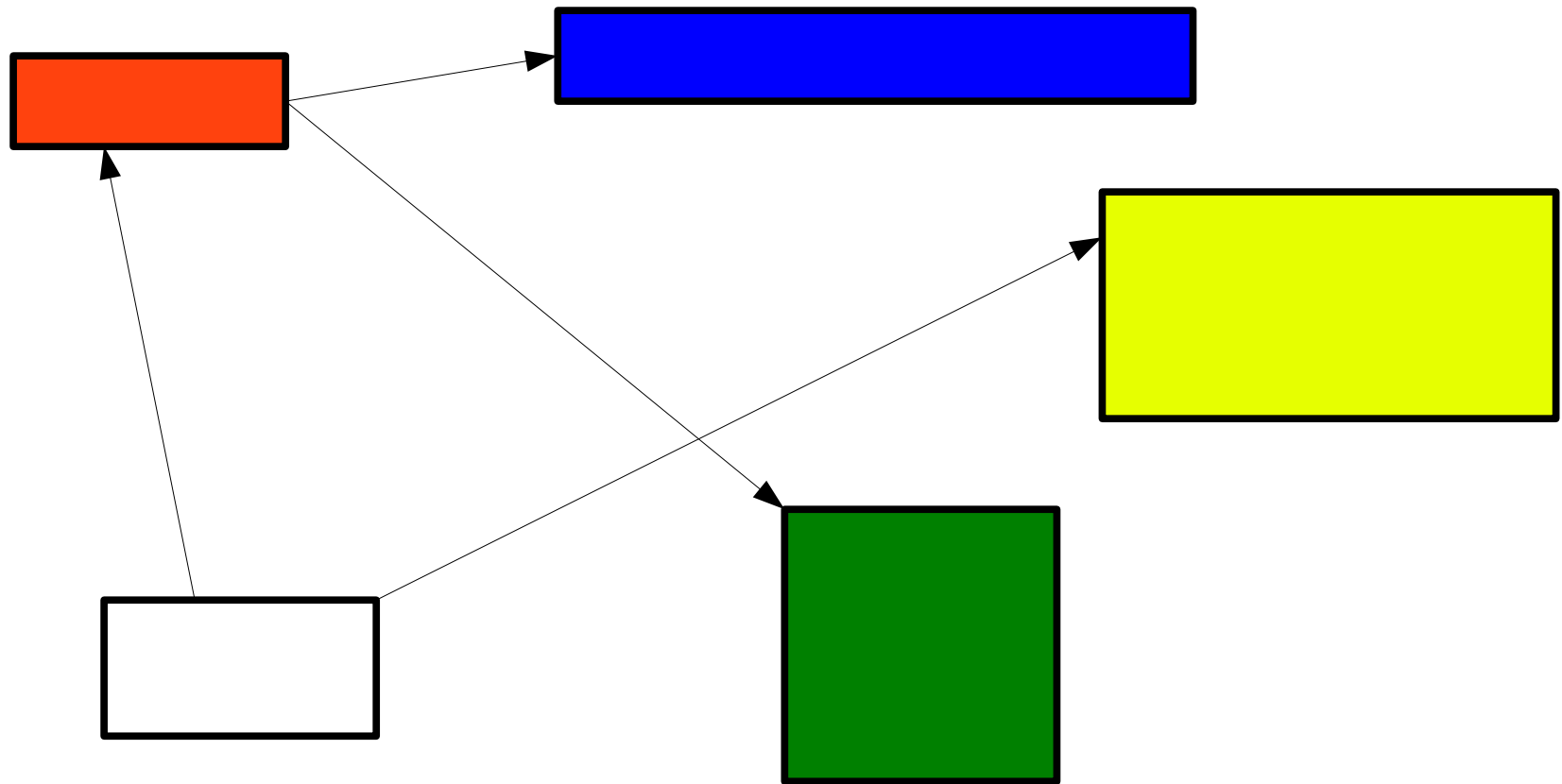
Update

Delete

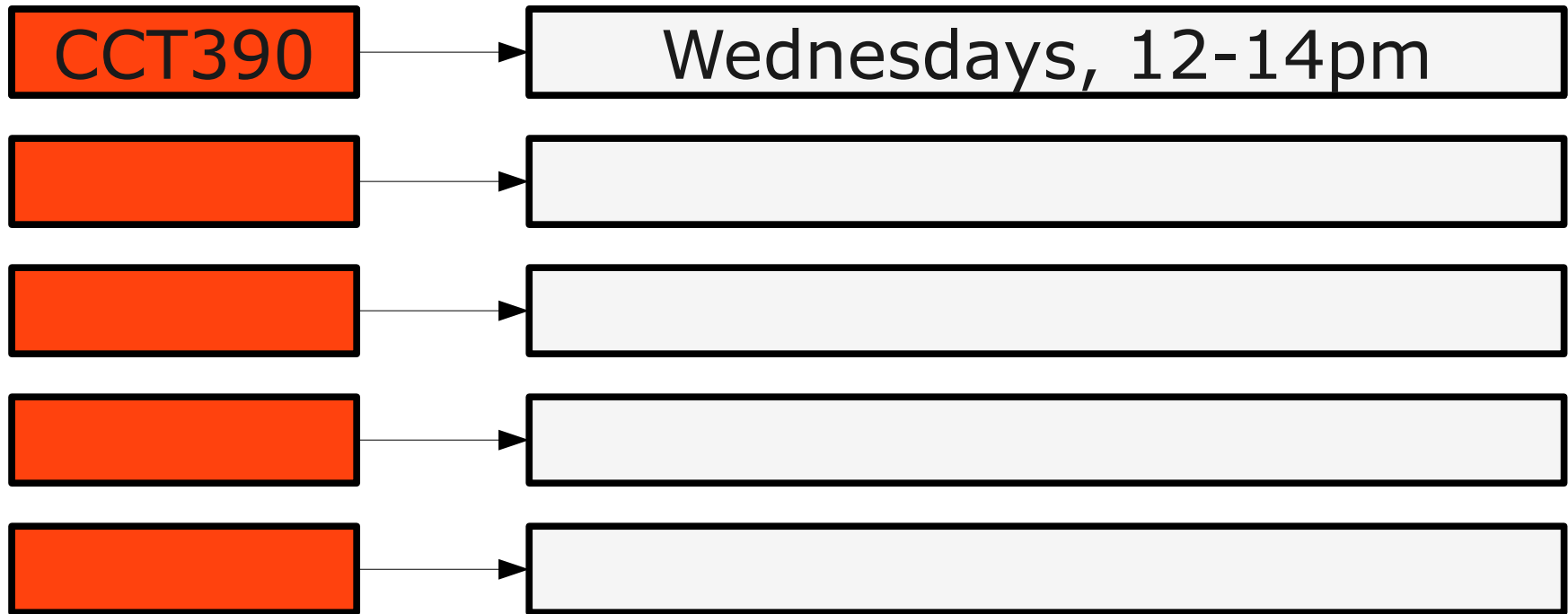
Database Elements



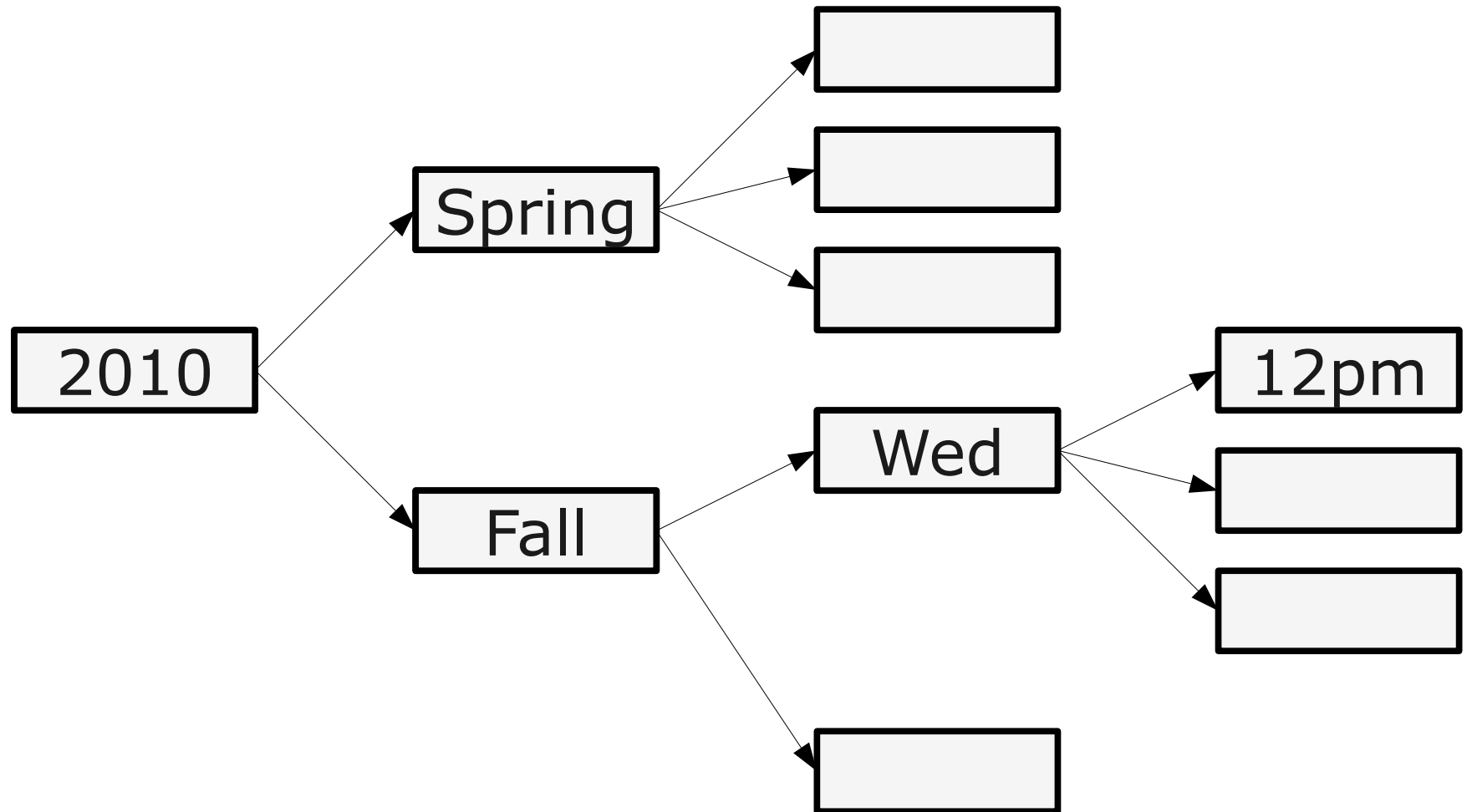
Databases Models



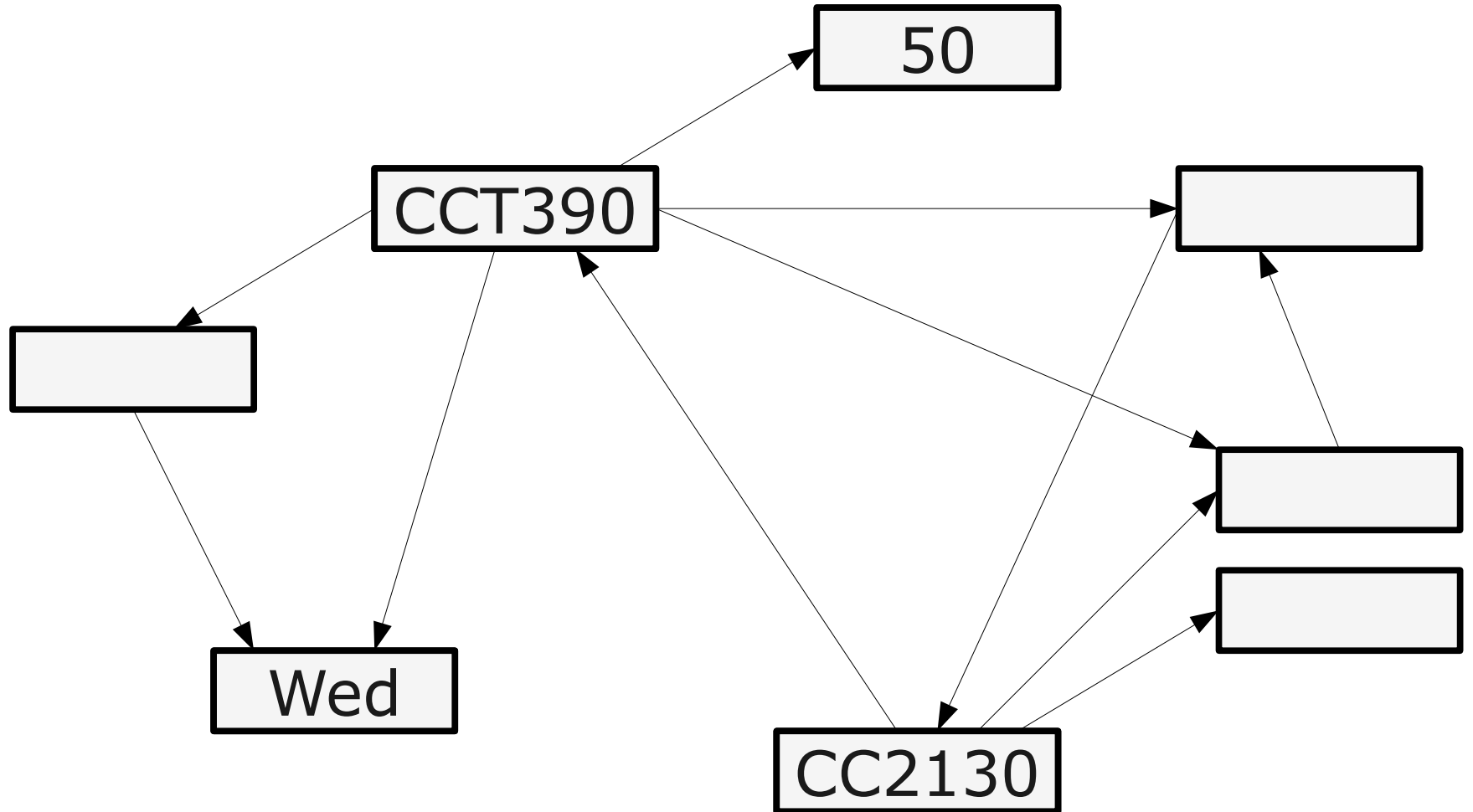
Key-Value



Hierarchical



Network



Relational

A notion of a “relation”



not to be
confused with
a “relationship”

A Relation

(CCT395H5F, Wed)

A Relation

(CCT395H5F, Wed, 12pm, 14pm,
CC2130)

(CCT490H5F, Wed, 9am, 11am,
CC3124)

A Relation

(CCT395H5F, Wed, 12pm, 14pm,
CC2130)

(CCT490H5F, Wed, 9am, 11am,
CC3124)

(CCT490H5F, 50)

(CC3124, 73)

Tabular Form

Room Assignment

CCT395H5F	Wed	12pm	14pm	CC2130
CCT490H5F	Wed	9am	11am	CC3124

Course Enrollment

CCT395H5F	50

Room Capacity

CC2130	70

Tabular Form

Room Assignment

CCT395H5F	Wed	12pm	14pm	CC2130
CCT490H5F	Wed	9am	11am	CC3124

Course Enrollment

CCT395H5F	50

Room Capacity

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Tabular Form

Room Assignment

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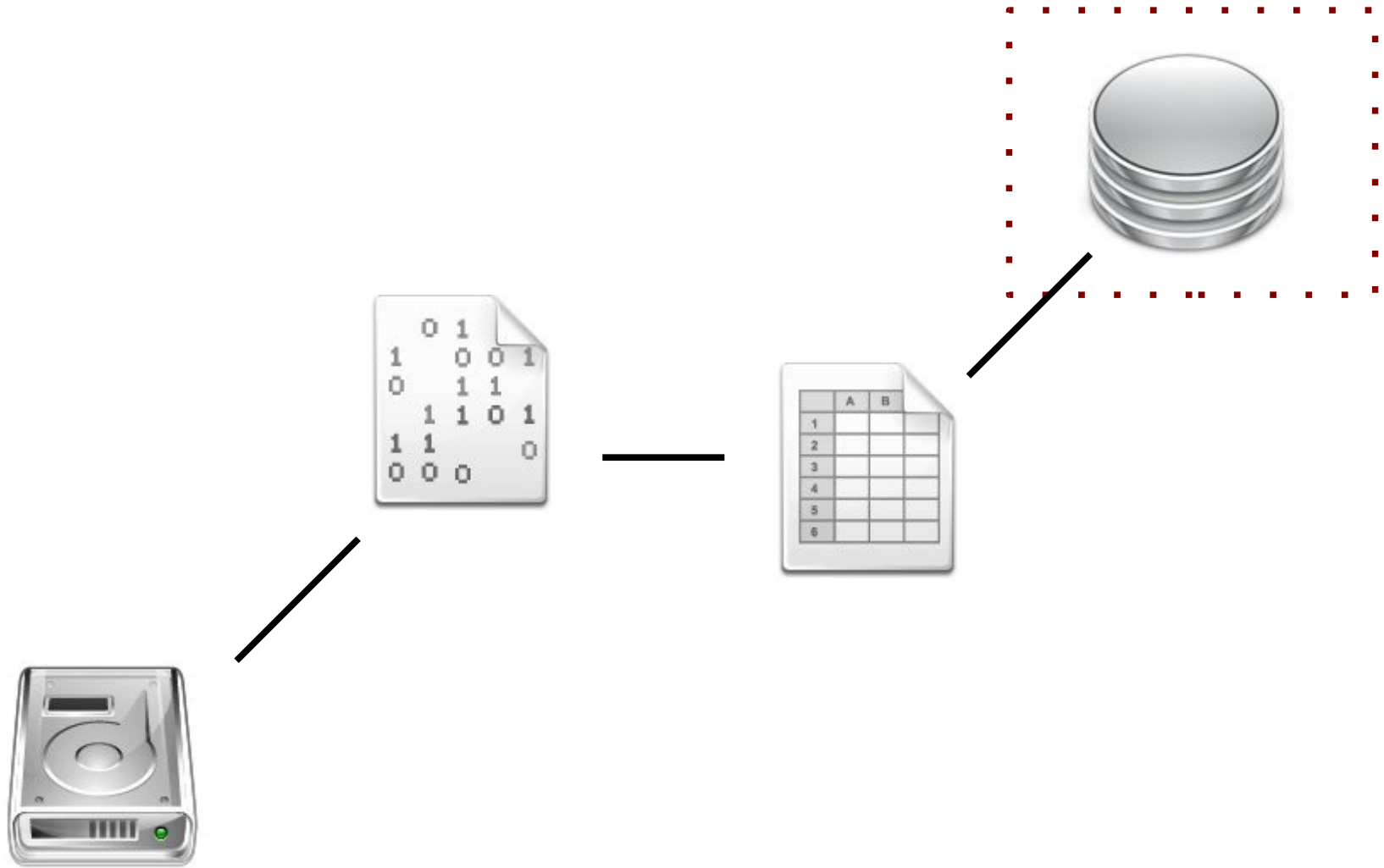
Room Capacity

CC2130	70

Relational Data Modeling

Finding a proper relational
representation for data

RDBMS



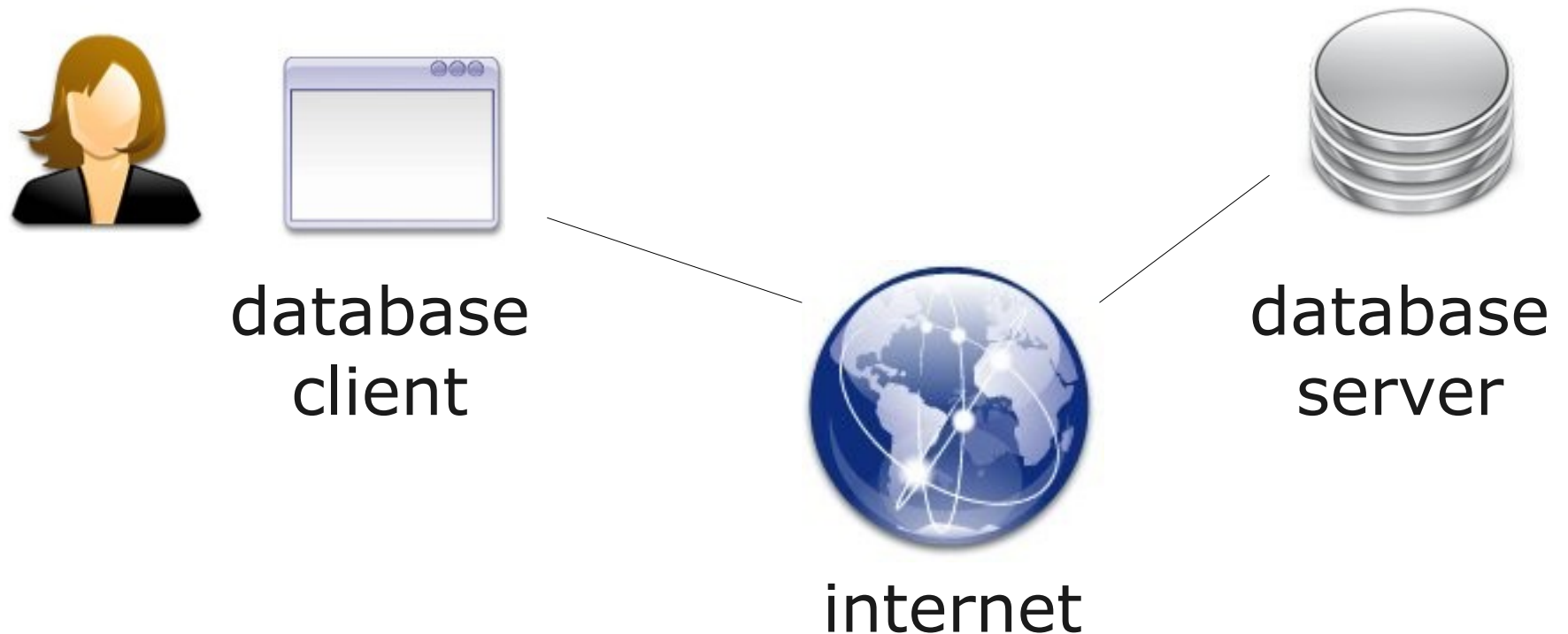
Accessing a Database



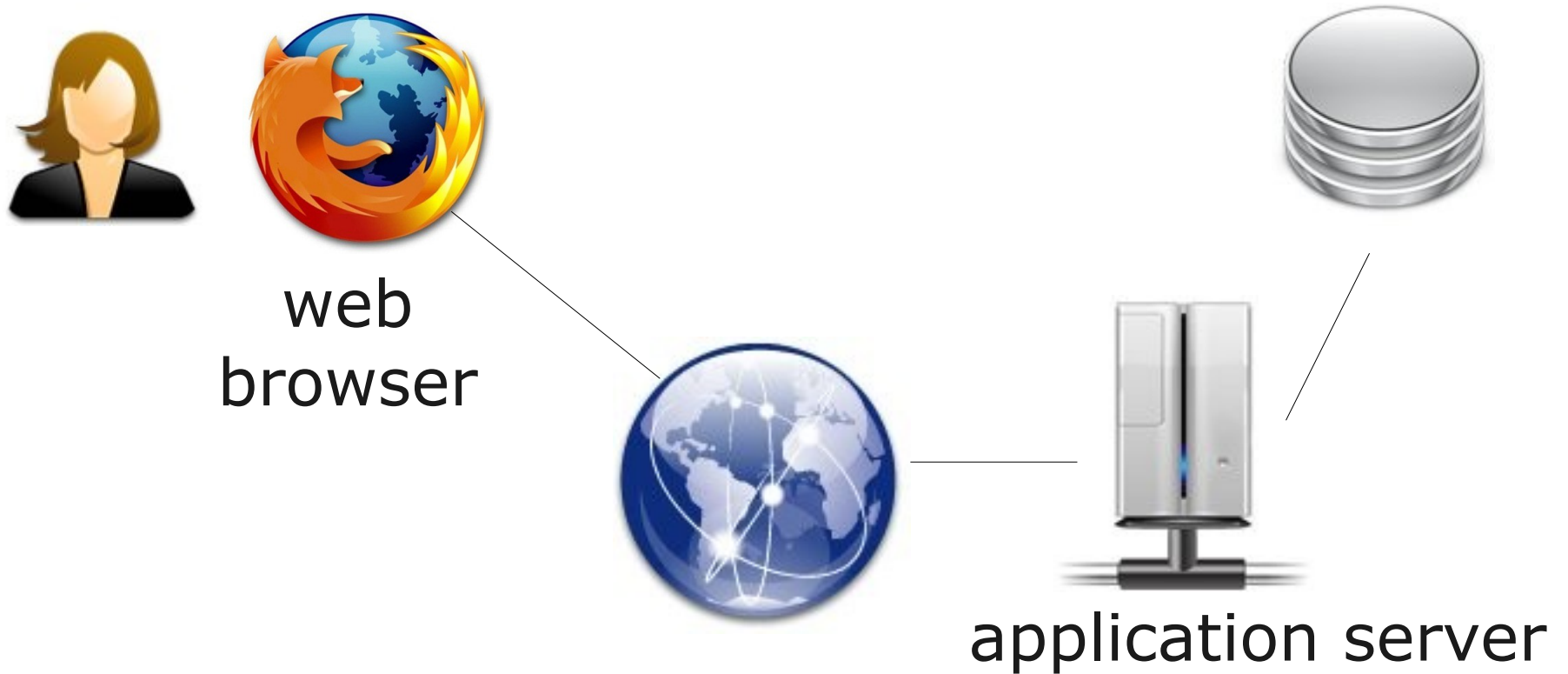
Built-in GUI



GUI Client for a Remote Database



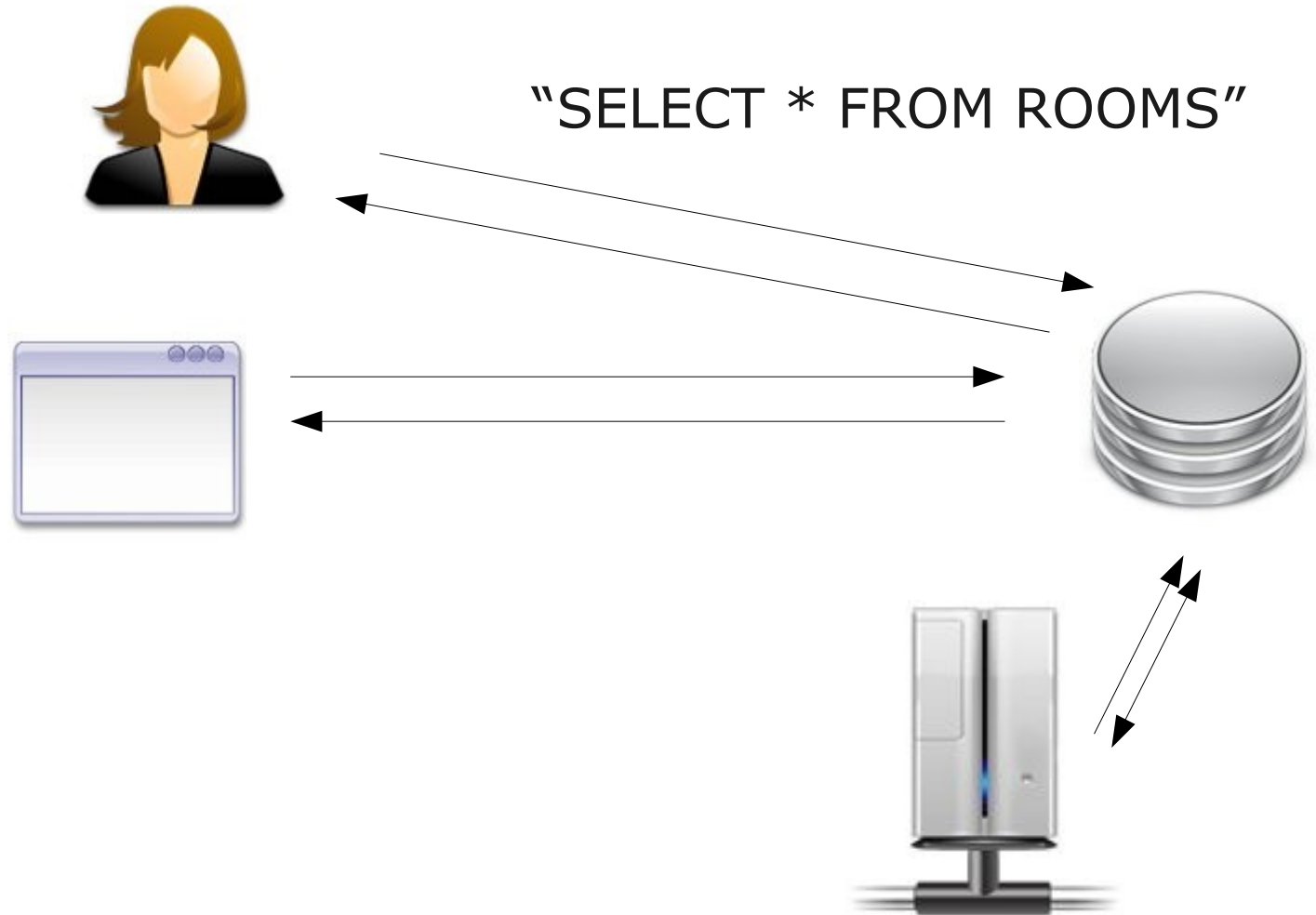
A 3-Tier System



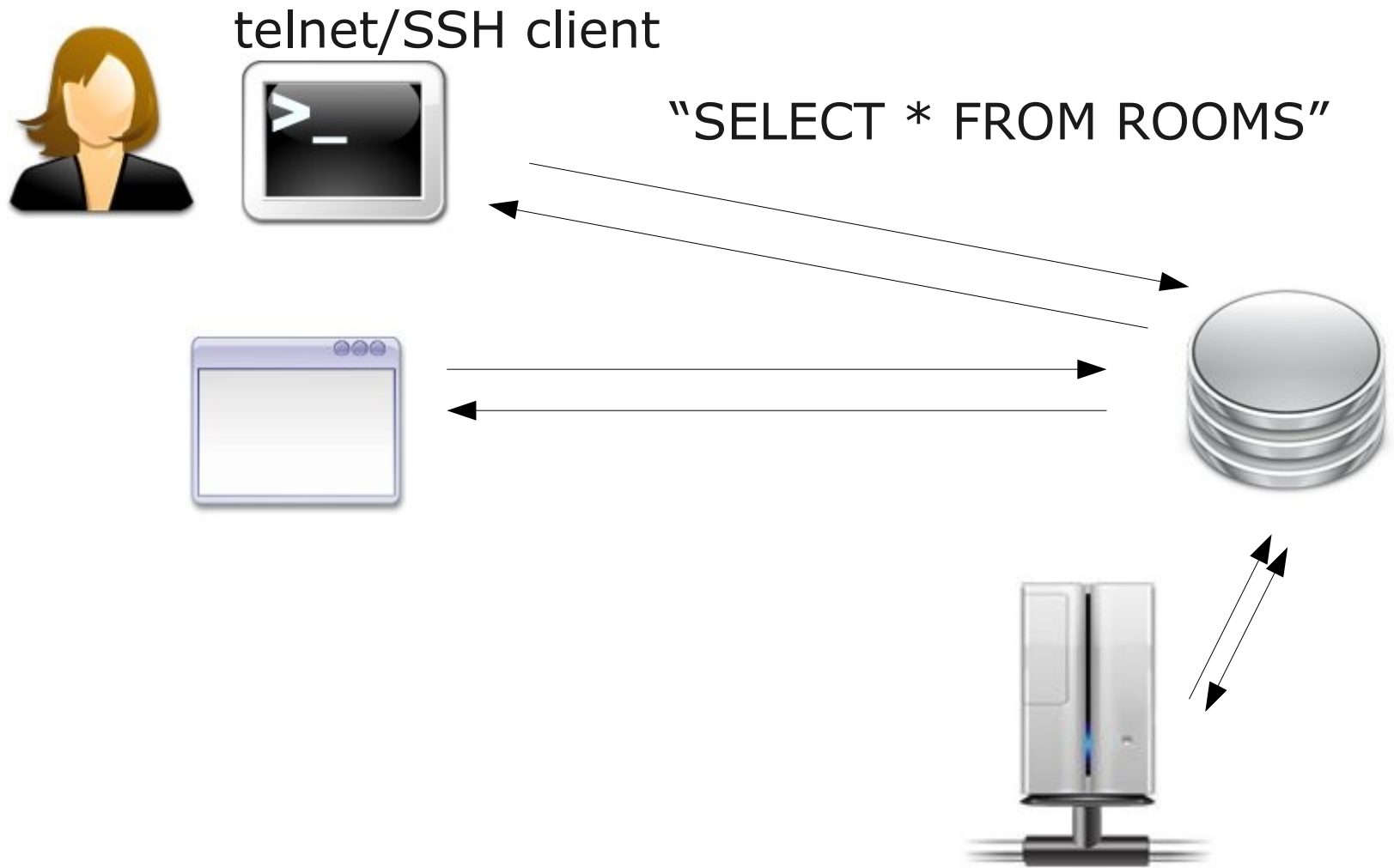
A Query Language



A Query Language



A Query Language



Structured Query Language

A Glimpse of SQL

```
select *  
from room_assignments  
where room_id="CC2130";
```

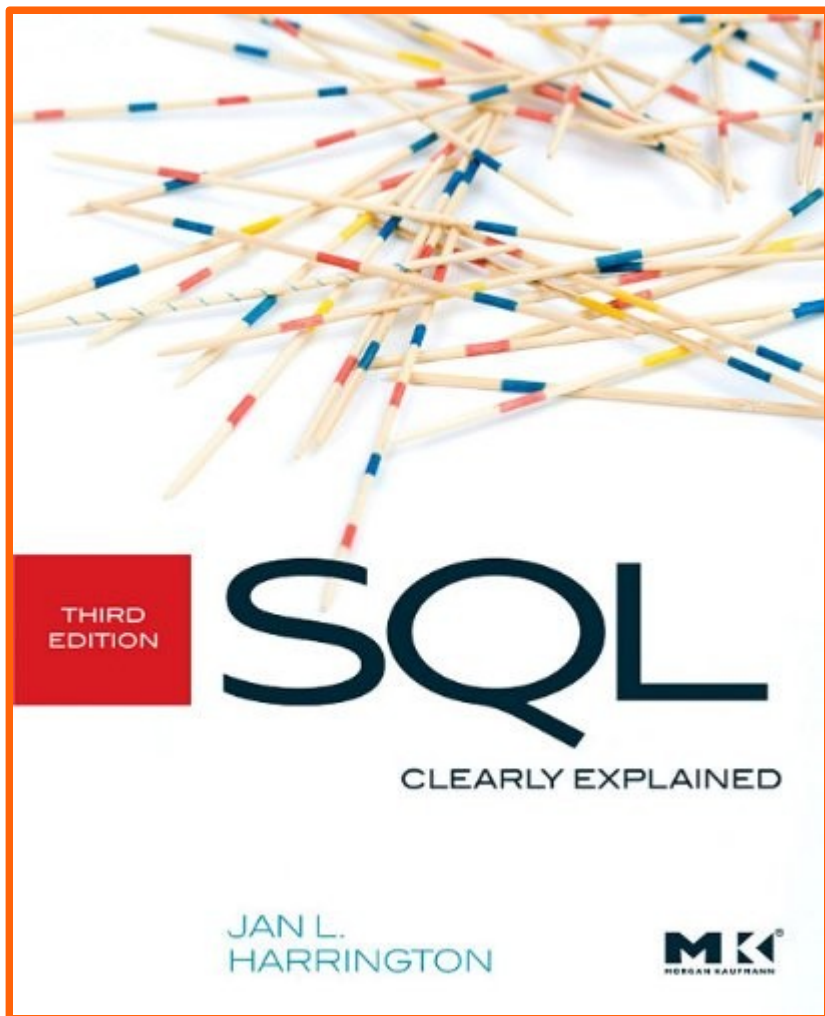
We'll do a demo later if we have time.

This Course

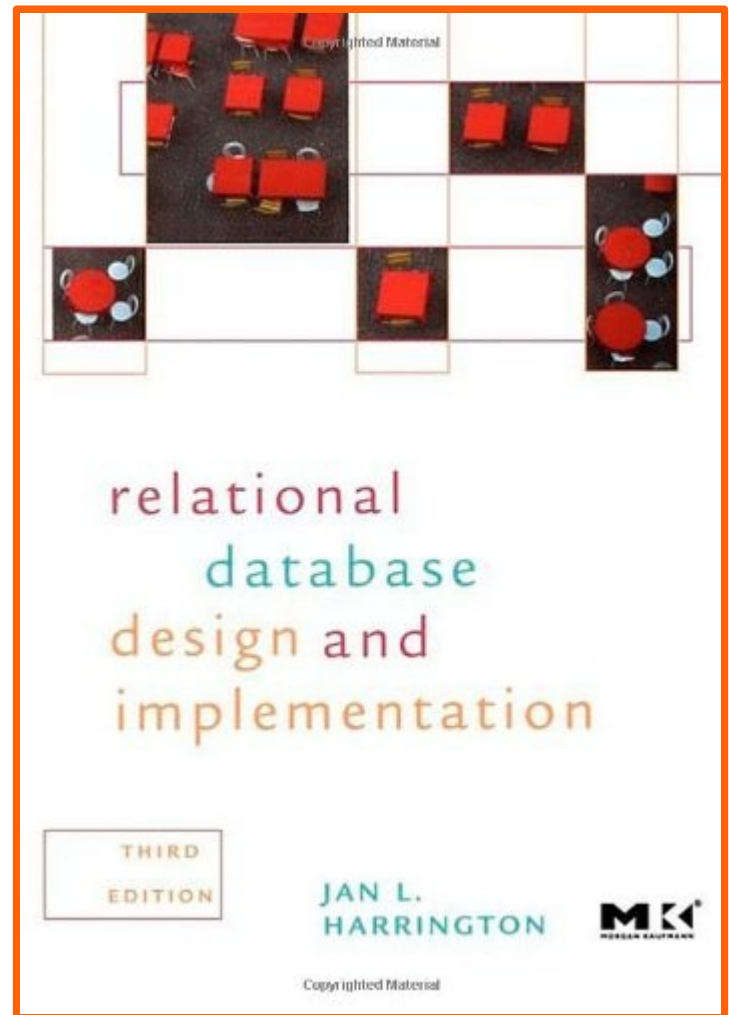
<http://bit.ly/cct395>

a shortcut for

<http://takhteyev.org/courses/10F/cct395/>

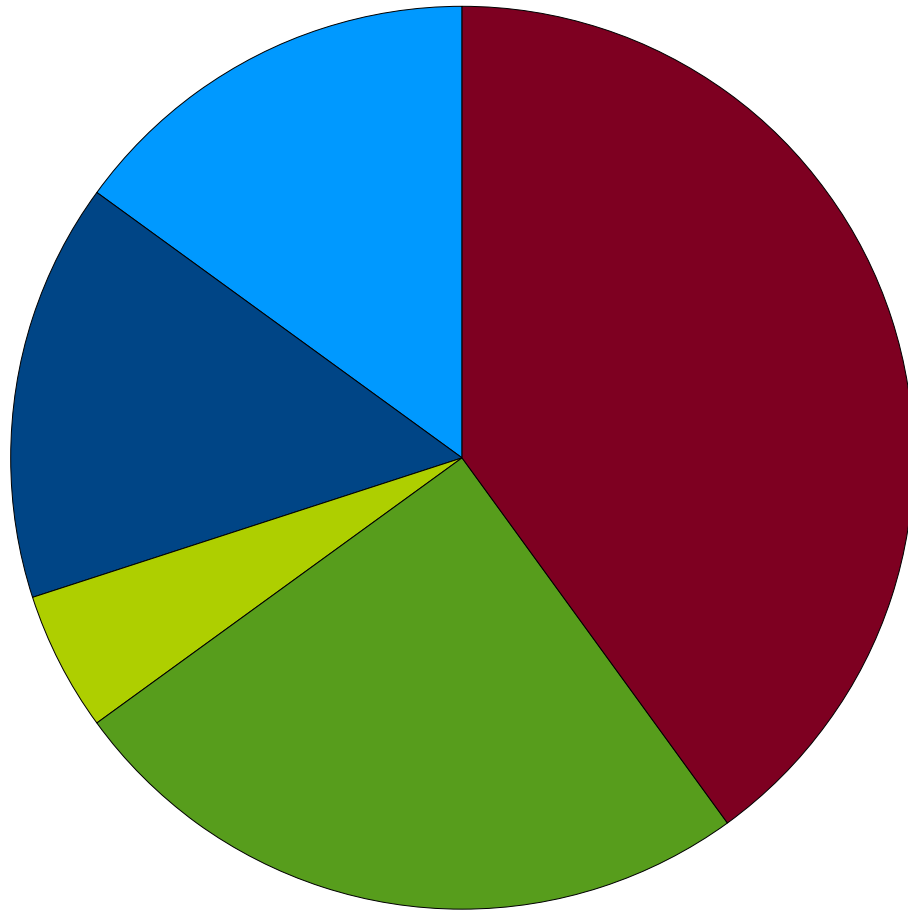


"SQL"



"RDD"

Grading



- Assignment 1: SQL
- Assignment 2: Database Design
- Project Proposal
- Project Report
- Final Exam

Due Dates

September				October				November			
8	15	22	29	6	13	20	27	3	10	17	24

assignment 1 due

assignment 2 due

project proposal due

project report due

Lecture Schedule

Week 2 | September 15

Relational Databases and SQL

The relational data model. Simple SQL retrieval.

Week 3 | September 22

More SQL

Queries using multiple tables. Inserting and modifying data. Creating tables.

Week 4 | September 29

Database Design

Requirements analysis. The ER model. ER diagrams.

Week 5 | October 6

Converting a Database Design into a Relational Form

Translating an ER diagram into relational form. Normalization.

Week 6 | October 13

Implementing a Database with SQL

Implementing a database with SQL. A case study.

Week 7 | October 20

Embedded SQL

Using an SQL database from within a program.
PHP. Stored procedures.

Week 8 | October 27

Databases and Documents

Full-text search. Markup languages. XML, YAML, JSON. Markup languages as input or output format. XML support in databases.

Week 9 | November 3

Databases and Objects

Object-oriented programming. Object-relational mapping. Objects in databases.

Week 10 | November 10

Database Security

Access rights. Views. Firewalls. SQL injection attacks. Stored procedures. Denial of service attacks. Backup and recovery.

Week 11 | November 17

Storage, Structure, and Performance

Representing tables. Indexing. Physical storage solutions.

Week 12 | November 24

Databases and Large Scale Computing

Virtualization. Grid computing. Distributed applications.

Contact Information

Office hours:

- Wed, 2-3pm, CC3018

Email:

- use UToronto mail
- "CCT390" in the subject line
- expect 2 day turn-around

Questions?