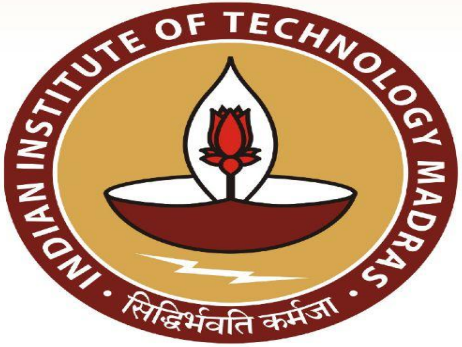

IIT Madras
BSc Degree

Models

Persistent Storage

- Example: Grades
- Need for persistent storage
- Requirements

Example: Gradebook

- Students: ID, name, address, …
- Courses: ID, name, department, year, …
- StudentCourse Relationship: which students are registered for which courses

Gradebook

	A	B
1	**Name**	**IDNumber**
2	Sunil Shashi	MAD001
3	Chetana Anantha	MAD002
4	Madhur Prakash	MAD003
5	Nihal Surya	MAD004
6	Shweta Lalita	MAD005
7	Raghu Balwinder	MAD006
8	Gulshan Kuldeep	MAD007
9	Kishan Shrivatsa	MAD008
10	Purnima Sunil	MAD009
11	Nikitha Madhavi	MAD010
12	Lilavati Prabhakar	MAD011
13	Rama Yamuna	MAD012

	A	B
1	**CourseID**	**Name**
2	EE1001	Introduction to Electrical Engineering
3	AM1100	Engineering Mechanics
4	MA1020	Functions of Several Variables
5	ME1100	Thermodynamics
6	BT1010	Life Sciences

Spreadsheets

- Arbitrary data organized into Rows and Columns
- Operations defined on Cells or Ranges
- Multiple inter-linked sheets within single spreadsheet

Any kind of **tabular** data - expressed in tables

Relationships

- Student - Course?

Relationships

- Student - Course?
- Separate entry with full details - student name, ID, address, course ID, name, department etc?

Relationships

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  - Redundant

Relationships

- Student - Course?
- Separate entry with full details - student name, ID, address, course ID, name, department etc?
  - Redundant
- Separate table “joining” students with courses
  - Only ID specified!
  - Relation specified with “Keys”

	A	B	C
4	MAD001	BT1010	78
5	MAD002	EE1001	30
6	MAD005	EE1001	68
7	MAD009	AM1100	62
8	MAD012	AM1100	77
9	MAD007	BT1010	41
10	MAD001	MA1020	56

Questions

- How should the underlying data be stored?
  - Can it be made persistent - survive server restart?
- How should the relations be represented?
- Structured ways to represent, manipulate data?