



# Overview of Course Projects

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# Project Tutorial

- Overview of Project Track 1 and Track 2
  - Timeline & Requirements
  - Tips
  - Project Showcasing
- Web Programming Basic
  - Development process
  - Frontend technologies
- Backend Development Tutorial



# Project Tracks

## Track 1

Build a relational database-centric application

- Web or mobile app
- Basic & advanced functions
- Both 3- and 4-credit students

## Track 2

Research survey on DBMS

- Paper (8-10 pages)
- Presentation (~ 10 slides)
- 4-credit students only



# What You Get Out of Project Track 1

- Use what you learn in class
- Come up with good ideas
  - Brainstorm
  - Survey
  - Pick the best idea
- Collaborate and coordinate with teammates
  - Task Assignment
  - Take on challenges
  - To grow is to do what you could not.



# Track 1 Timeline

Stage	Due Date	Milestone
0	6/27	Team Formation
1 (4%)	7/8	Project Functions
2 (3%)	7/14	ER Design & Development Plan
3 (3%)	7/19	DB Schema & Development Environment Setup
4 (30%)	7/25-26	Midterm Demo
5 (60%)	8/3-5	Final Demo



## Stage 0. Team Formation

- Size constraint: 3-4 People
- No constraint: undergrad/grad
- We will only CATME for students who couldn't find a team
- Tips
  - Diversity
    - UI, frontend
    - Server, backend
    - Data acquisition & pre-processing
    - Data analytics & visualization
  - Leadership



# Project Groups

- We will also use CATME system for team evaluation
- Each member receives a grade based on his or her teammates evaluation on CATME
- If someone drops out, the rest pick up the work (sorry!)
  - That's why we want to form team of 4, instead of 3



# Stage 1. Project Description and Functions

## Design Principles

- Purposeful
  - Does it solve an actual problem, meet a real need?
- Unique
  - Is it a mere clone of an existing product?
  - Innovation:
    - UX/UI (think about what you often complain as a user)
    - Engineering: performance, scalability, reliability
- Real
  - Data source: web crawling, user contribution
- (Realistic)





# Stage 1. (cont.) Advanced Functions

## Questions to ask yourselves:

- Do you actually implement the advanced functions?
  - Do you get the result via straightforward SQL queries or API calls to libraries/services? No!
  - You don't have to build it from scratch, but if you are to use an existing library/service, your effort has to involve a substantial data preprocessing and functional extension to achieve your goal.
- Is it challenging?
  - "We implemented a recommendation engine, using cosine distance." No (unless you have *advanced* feature vectors).
  - Document the difficulties and trickiness in detail.
    - Even if you tried something ambitious, but it didn't work great, still document the process.
    - There is an "effort" component in your grade!



## Stage 2. ER Design and Development Plan

- Project Timeline with Milestones
- Division of Responsibilities
- Source of Data
- Development Stack
  - Client
  - Server
  - DBMS
  - (Optional) Frameworks/libraries for advanced functions
- ER or UML Design



## Stage 3. DB Schema and Development Environment Setup

- DB Schema (from ER Design)
  - Constraints, Views,...
- Set up your source code repository for version control and collaboration
- Set up your stack locally
- Set up your stack remotely (OPTIONAL - Extra Credit)
  - Engineering Web Hosting via cPanel (not recommended), OR
  - Commercial Options (such as AWS or Heroku)



## Stage 4. Midterm Demo

Via your own Admin UI

- CRUD
- Two Advanced Queries
  - Subqueries
  - GROUP BY, Aggregate functions, HAVING
  - If conditions (CASE)
  - Set operations (e.g. EXCEPT)



## Stage 5. Final Demo

- Meet minimum data requirement
- Complete demo video
- Project report
- Live demo of advanced functions
- **5% Bonus Points for the 5 Best Projects**



## Project Track 2 -- 4-credit

- 4-credit students do both:
  - project 1 (DB application)
  - project 2 (**survey** on one of cutting-edge DB research topics and **presentation**)



# Goal of Writing Survey Paper

- Expert knowledge of the **state-of-the-art**
  - **Don't** reinvent the wheel
  - Really understand the connections between methods
- Build a special angle on a topic and identify prospective research problems
- Improve your knowledge on **critical** thinking skills and analytical work with a lot of scientific literature



# List of Topics (must choose one of them)

- Main-memory database systems
- Interactive visualization systems
- Columnar databases
- Auto-tuning of database systems
- Approximate query processing
- Stream processing systems
- Graph database systems
- Semi-structured database systems
- OLAP Systems
- Multi-query optimization
- Parallel query optimization





# How to get started?

- Read 5-10 surveys from ACM Computing Surveys to get the idea of material organization
  - What are the typical sections?
  - How long it should be?
  - How to present ideas?
- Select a few interesting topics and:
  - Search for existing surveys and assess their quality
  - Estimate the amount of papers published
  - Is topic trendy, popular, important, impactful?
  - Pick the one that you will write about!



## Have Materials and a Plan

- Find top researchers and research groups, conferences, journals, demo systems on selected topics
- Skim through highly cited, recent articles of prominent researchers to get a good approximation of other good works
- Write a plan with the answers to questions:
  - Why your survey will be important? What's new? What perspective you want to open?
  - Set deadlines for yourself and follow them
  - Add key citations at the end of the proposal



# Paper Sources

- Top Database Conferences
  - VLDB, SIGMOD, SIGKDD, etc.
- Top Database Journals
  - TODS, TOIS, TKDE, etc.
- Search Engines
  - Google Scholar
    - <https://scholar.google.com/>
  - DBLP
    - <http://dblp.uni-trier.de/>



# Typical Timeline

- 1 week for paper selection, initial reading, and survey idea formalization
- 2-3 weeks writing an initial draft
- 2-3 weeks for the final editing before submission
- **Think Big!** You really can submit it to a journal!



## Track 2 Deadlines

- Stage 0 (due: 23:59 pm, 6/27) **Survey teams formation**
  - In addition to project 1 team
  - Create Team page in Wiki
- Stage 1 (due: 23:59 pm, 7/8) **Survey proposal submission**
  - Title, Author, Abstract, Proposal (most important part).
  - Upload a PDF file to your team page
- Stage 2 (due: 23:59 pm, 7/30) **Survey final draft submission**
  - Final draft: 8 - 10 pages
  - 10 slides presentation