CoIDE

Collaborative IDE

Background

- TuringLab teaches children how to code.
- Children aged 8 - 13 come to Imperial on Saturdays.
- Teach them Scratch, then move on to Python.

The Problem

- It is hard to organise a class of students.
- Students work at different speeds.

They need an Educational Platform.

Existing Technologies

- Google Docs.
- Cloud9
- Codio

The Solution

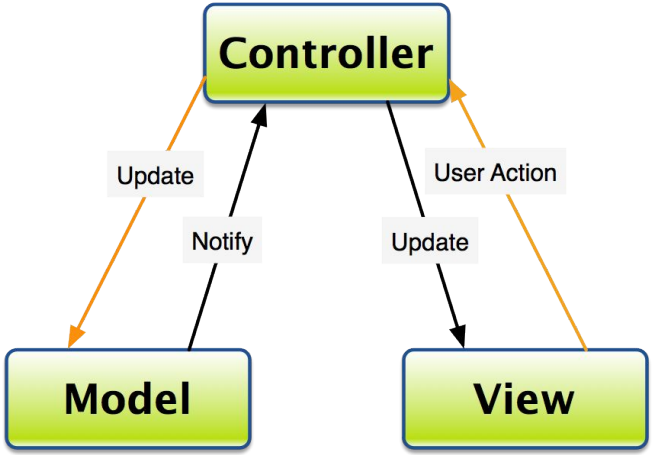
Create a Collaborative IDE specifically for TuringLab: ColDE

- Supports JavaScript and Python.
- Allows collaboration.
- Manage multiple student projects.
- Manipulate student code and provide comments.

Demonstration

CoIDE - Back End

- Python 3
- Flask
- SQLAlchemy
- MVC (Model-View-Controller) architecture

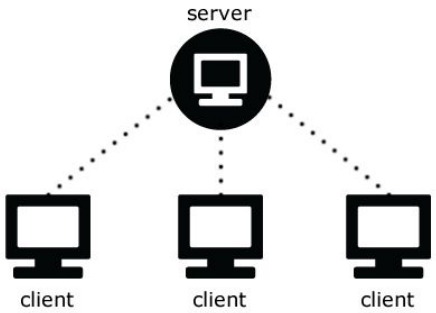


CoIDE - Front End

- HTML, CSS and JavaScript
- JQuery
- Bootstrap

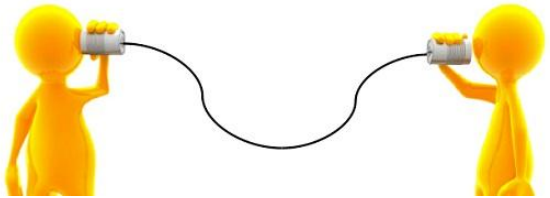
CoIDE - Network Architecture

- All events happening in client are sent to server
- The server broadcasts them to the clients supposed to receive them
- No peer to peer communication



CoIDE - Client-Server Communication

- Small quantities of data transferred very often
- Need for a low latency communication
- WebSocket protocol: full-duplex TCP communication

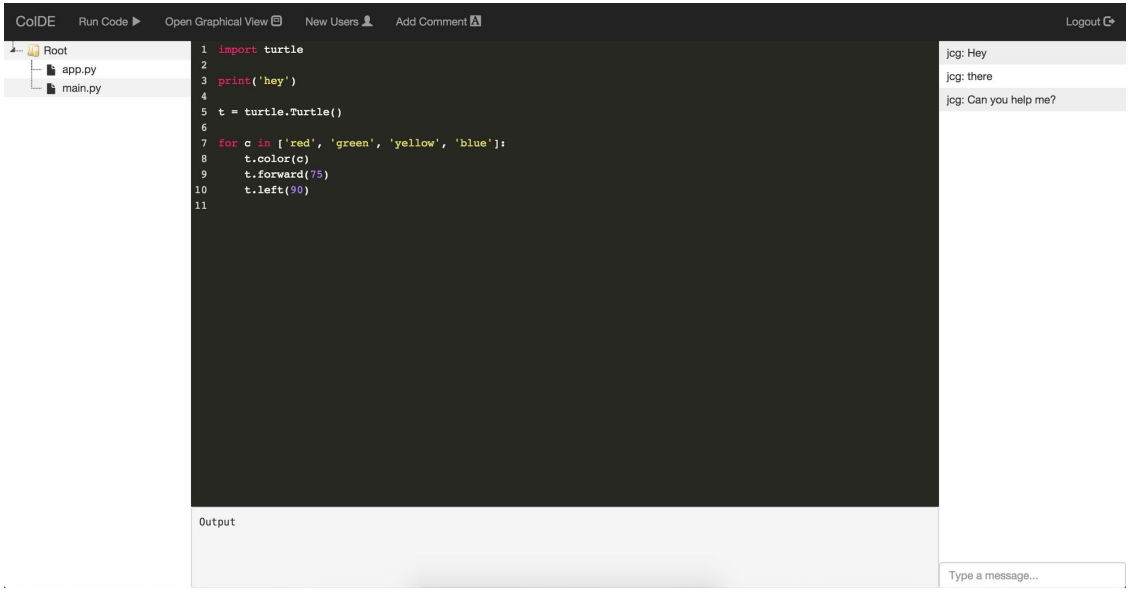


Synchronisation

- The system has a delay.
- A local change creates a *changeset*.
- A *changeset* contains 4 things:
  - Size of file before change
  - Size of file after change
  - List of operations
  - A “*char bank*”
- Client state and Server state

The Editor

- Use CodeMirror, a versatile text editor implemented in JavaScript.
- Supports JavaScript and Python and HTML/CSS.



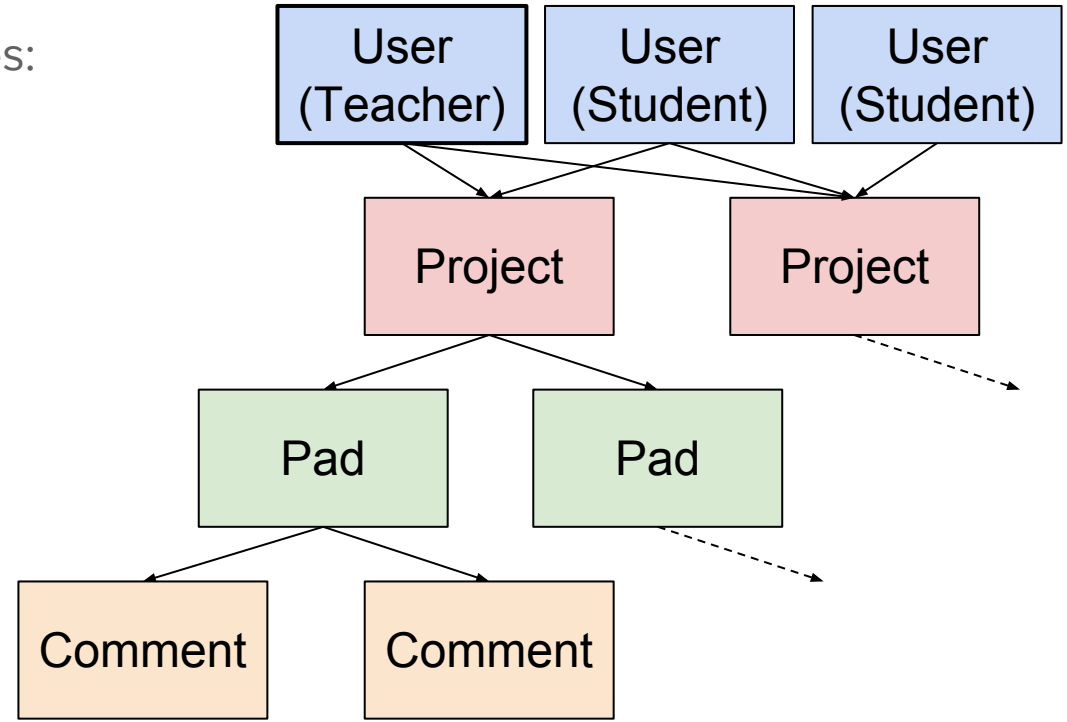
Executing Code

- Runs on the client side.
- Use Skulpt to run Python.
- Use iframes for HTML/CSS.
- Run Javascript through the browser’s console.

Database Structure

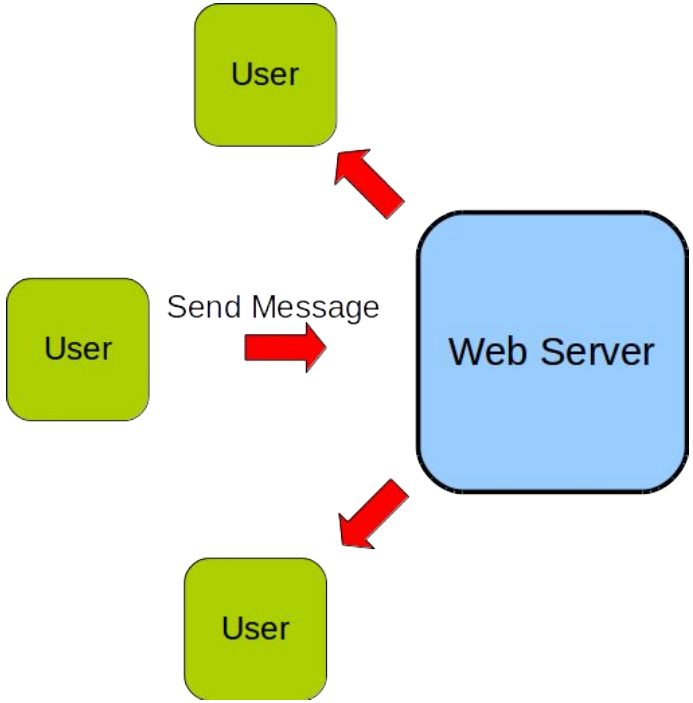
ColDE uses a set of data structures:

- User
- Project
- Pad
- Comment



Chat System

- Built using socket.io and JQuery.
- Based on Web Socket messages.
- Send a message to the server.
- Server broadcasts to all other clients.

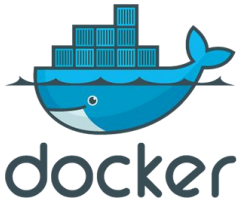


Project Management

- Kanban development method
- Slack
- Trello

Deployment

- Deployed on Digital Ocean.
- Considered using Heroku.
- Docker and Dokku.



Summary

- ColDE is an educational system.
- Helps children to help each other.