Assignment 3: Multitier and Web

Spring 2016
Multitier Architectures

Alternative client-server organization methods
(Source: Tanenbaum: Distributed Systems)
Goal of the Assignment

• Investigate practical effects of various multitier organizations

• Where should functionality reside?
  • Client, server, or network?

• Concrete examples of good and bad choices
Three Tasks

• Task 1: Implement server-based calculator
• Task 2: Migrate some functionality on client side
• Task 3: Implement caching on client side
Simple Calculator

- Write simple calculator server
- Two arguments, one operator, submit button
- Possible operators +, -, *, and /
- Input form looks like this:
Results from Server

• Server returns result of calculation and new input form

• Must keep track of all previous calculations and show their results on screen
  • Just like old tape calculators

• How you implement history is up to you
  • Several possible solutions exist
Client

- You need to write several versions of the client
- Follow the three steps specified in the following slides
- All three steps are required to pass the course
Client: Step 1

- Modify form to have only 1 input field and submit
- Write Javascript to parse input field
- Send each “atomic” operation to server
- Precedence left-to-right
Step 1: Example

- Input field has expression: “1 + 2 * 3 / 4”
- Three requests sent to server
- Output:
  - 1 + 2 = 3
  - 3 * 3 = 9
  - 9 / 4 = 2.25
Client: Step 2

- Recognize sine function “sin(x)” and plot it

- Implement three variants of plotting:
  1. All on server
  2. All on client
  3. Client uses atomic operations on server and plots locally
Client: Step 3

• Implement caching of results on client side

• Configurable number of results (0-N)

• Use cached results whenever possible

• Implement “Simplify” button to demonstrate cached results

• Experiment with cache sizes and plot number of sent messages (in a separate document)
Guidelines

• Group work: **Maximum group size 2 people**

• See assignment sheet for further information

• Use users.cs.helsinki.fi for running your scripts
  
  • Ask Ossi for help if needed

• No external libraries except as explicitly specified

• Free selection of server-side code
What to Return?

• Source code of all programs
• Documentation on how to compile/run them
  • Describe implementation choices as well
• For groups: Report on individual contribution

• DEADLINE: March 13 at 20:00
• Q&A sessions on Tue and Thu until March 3rd