EECS 22L: Software Engineering Project in C Language
Lecture 10

Rainer Dömer

doemer@uci.edu
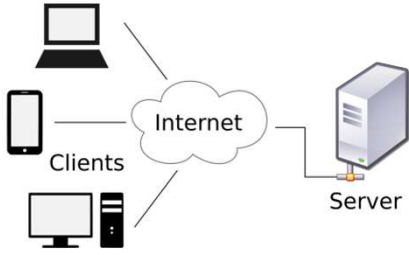
The Henry Samueli School of Engineering
Electrical Engineering and Computer Science
University of California, Irvine

Lecture 10: Overview

- **Project 2 Technical Discussion and Advise**
  - Client-server software architecture
  - Event-based GUI programming

- **Discussion on GUI design**
  - GTK+ tutorial
  - Cairo graphics rendering
  - GTK clock server example

Project 2: Software Architecture

- Client-Server Software Architecture
  - Software applications communicating via the Internet
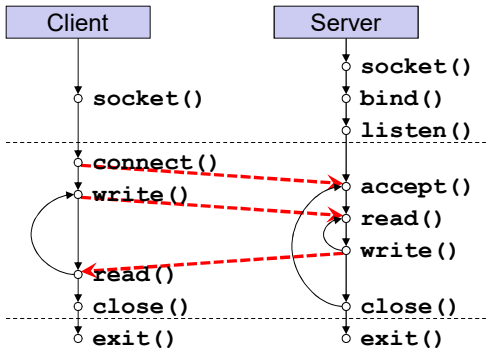
Source: David Vignoni (LGPL, wikipedia.org)

  - Server: provides a service function to one or more clients
  - Client: initiates requests for service
  - Internet: communication network to exchange messages

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Project 2: Client-Server Communication

- Discussion on Socket Communication
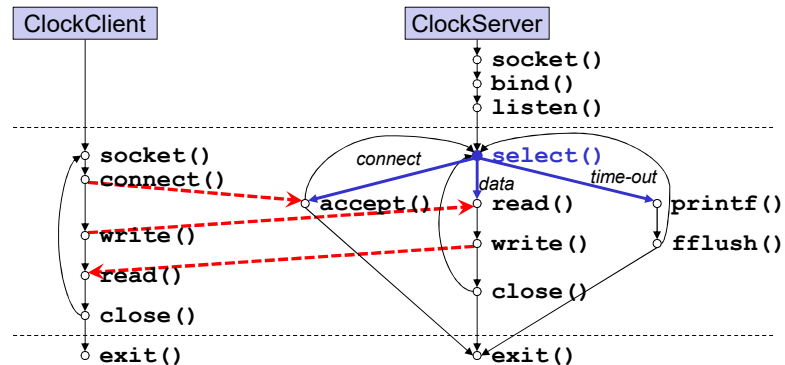 - Sequence Diagram for client-server example

Client	Server
socket()	socket()
	bind()
	listen()
connect()	accept()
write()	read()
	write()
read()	
close()	close()
exit()	exit()

  ➢ This simple example can handle only one client at a time,
    others have to wait for their turn to connect (they are blocked)
  ➢ *Blocking communication* can stall both the client and the server!

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Project 2: Client-Server Communication

- Multiplexing multiple client connections with `select()`
  - ClockServer example: `~eecs22/ClockServer.tar.gz`

ClockClient / ClockServer sequence diagram

> Wait simultaneously to connect, to transfer data, or for time-out!
> Keep sequential execution short
> Limit client-server interaction to one request at a time

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Project 2: GUI Programming

- GTK+ 2.0 Infrastructure
  - Tutorial: https://developer.gnome.org/gtk-tutorial/stable/
  - Reference: https://developer.gnome.org/gtk2/2.24/
  - Widgets: https://developer.gnome.org/gtk2/2.24/ch02.html
- Cairo Graphics Rendering
  - Tutorial: http://zetcode.com/gfx/cairo/
  - Samples: https://cairographics.org/samples/
- GUI clock server example:
  > `~eecs22/GTK_ClockServer.tar.gz`
  - `GTK_ClockClient.c`
  - `GTK_ClockServer.c`
  - `Makefile, README`
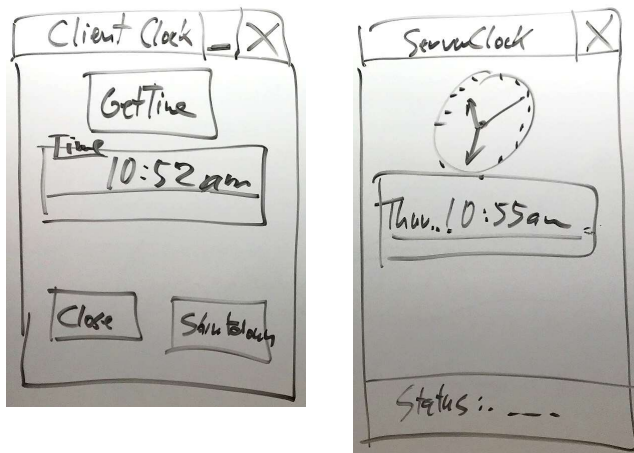 > Online demonstration!

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Project 2: GTK Clock Server Example

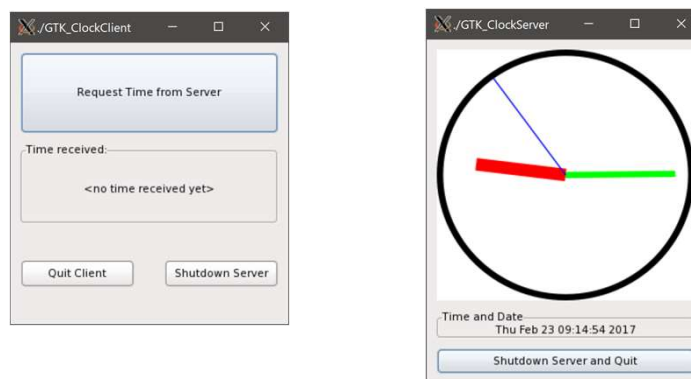- Sketch of the Client and Server Windows

Project 2: GTK Clock Server Example

- Screenshot of the Client and Server Windows