CS 580 Client-Server Programming
Spring Semester, 2005
Doc 1 Introduction

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References

Code Complete by Steve McConnell

Course Introduction
Course Outline

Introduction
Testing
Source Version Control
Network Basics
GUI
Client Development Issues
Concurrency
Server Types & Structure
Client-Server Protocols
Logging
Databases
Security
Web based Applications
   CGI, Fast-CGI, Servlets
Web Services
Advanced topics

This outline will be changed during the semester.

Main Points of Class

Common design issues & solutions for building a server

Issues in designing a client-server network protocol

Handling Concurrency

Accessing databases

Programming issues dealing with working on client-server code

Programming languages for the Course

Java

We will be using parts of JDK 1.5

Smalltalk – VisualWorks 7.3

C#

Not supported

What does it mean to "Know" Java, C# or Smalltalk

Basic syntax of the language

Core API

No one knows the entire API of either language

You should have good grasp of the common or core API

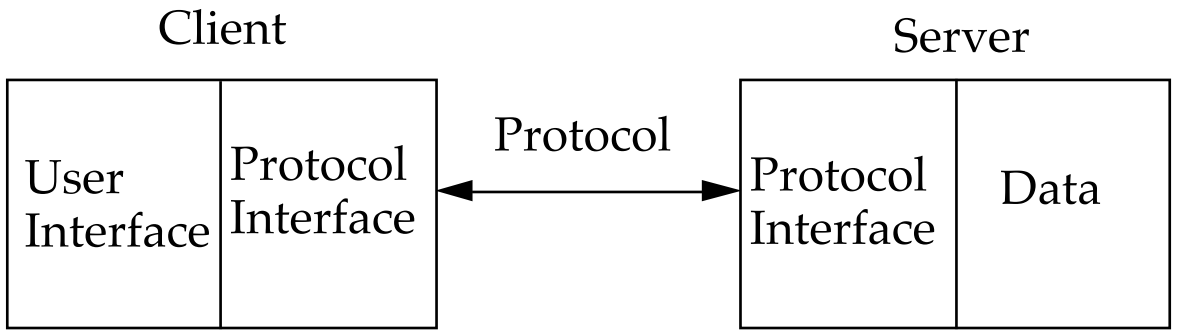
Collections, Files, Exceptions, Streams

Language culture - Ways of doing things in each language

- Java Doc
- Searching the API
- Compiling/running code
- Using Smalltalk browsers
- Naming conventions

Object-oriented programming

Introduction to Client-Server
What is Client-Server?



Client

Application that initiates peer-to-peer communication

Translate user requests into requests for data from server via protocol

GUI often used to interact with user

Server

Any program that waits for incoming communication requests from a client

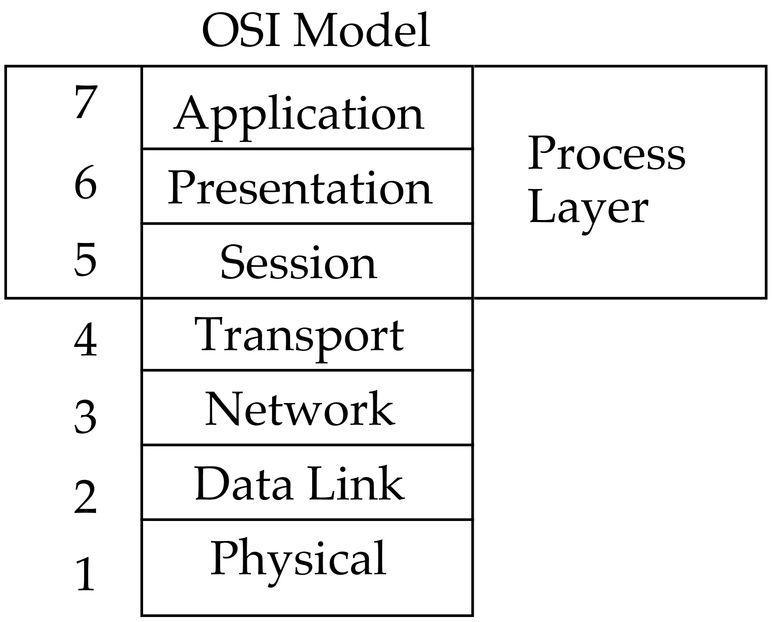
Extracts requested information from data and return to client

Common Issues

- Authentication
- Authorization
- Data Security
- Privacy
- Protection
- Concurrency

What this Course is not

An advanced (or beginning) Networking course



How to use a client builder application/system

Powerbuilder

What this Course covers

Skills & knowledge required to build client-server applications

What Client-Server Requires of a Programmer

- Designing robust protocols
- Network programming
- Designing usable computer-human interfaces
- Good documentation skills
- Good debugging skills
- Understand the information flow of the company/customer
- Mastery of concurrency
- Multi-platform development
- Database programming
- Security

Programming Issues
Naming Convention for Classes, Variables & Methods

- Use full words – avoid abrvtns

Pascal Casing

Capitalize the first character of each word

SomeClassName

Camel Casing

Capitalize the first character of each word except the first word

someVariableName

Item	Java	Smalltalk	C#
Class	PascalCase	PascalCase	PascalCase
Method	camelCase	camelCase	PascalCase
Field	camelCase	camelCase	CamelCase
Parameter	camelCase	camelCase	camelCase
Local Variable	camelCase	camelCase	camelCase

Names

"Finding good names is the hardest part of OO Programming"

"Names should fully and accurately describe the entity the variable represents"

What role does the variable play in the program?

Data Structure	Role, function
InputRec	EmployeeData
BitFlag	PrinterReady

Some Examples of Names, Good and Bad

TrainVelocity	Velt, V, X, Train
CurrentDate	CD, Current, C, X, Date
LinesPerPage	LPP, Lines, L, X

Names should be as short as possible and still convey meaning to the reader

Comments

"Comments are easier to write poorly than well, and comments can be more damaging than helpful"

What does this do?

```
for i := 1 to Num do
 MeetsCriteria[ i ] := True;
for  i := 1 to Num / 2  do begin
 j := i + i;
 while ( j <= Num ) do begin
  MeetsCriteria[ j ] := False;
  j := j + i;
 end;
for i := 1 to Mun do
 if MeetsCriteria[ i ] then
  writeln( i, ' meets criteria ' );
```

How many comments does this need?

```
for PrimeCandidate:= 1 to Num do
   IsPrime[ PrimeCandidate] := True;

for  Factor:= 1 to Num / 2  do begin
   FactorableNumber := Factor + Factor ;
   while ( FactorableNumber <= Num ) do begin
      IsPrime[ FactorableNumber ] := False;
      FactorableNumber := FactorableNumber + Factor ;
   end;
end;

for PrimeCandidate:= 1 to Num do
   if IsPrime[ PrimeCandidate] then
      writeln( PrimeCandidate, ' is Prime ' );
```

Good Programming Style is the Foundation of Well Commented Program

Commenting Paragraphs of Code

Write comments at the level of the code's intent

Comment the why rather than the how

Make every comment count

Document surprises

Avoid abbreviations

How verses Why

How

```
/* if allocation flag is zero */
if ( AllocFlag == 0 ) ...
```

Why

```
/* if allocating a new member */
if ( AllocFlag == 0 ) ...
```

Even Better

```
if ( AllocFlag == NEW_MEMBER ) ...
```

Summary comment on How

```
{ check each character in "InputStr" until a
  dollar sign is found or all characters have
  been checked }

Done   := false;
MaxPos := Length( InputStr );
i      := 1;
while ( (not Done) and (i <= MaxLen) ) begin
   if ( InputStr[ i ] = '$' ) then
      Done := True
   else
      i := i + 1
end;
```

Summary comment on Intent

```
{ find the command-word terminator }

Done   := false;
MaxPos := Length( InputStr );
i      := 1;

while ( (not Done) and (i <= MaxPos ) ) begin
   if ( InputStr[ i ] = '$' ) then
      Done := True
   else
      i := i + 1
end;
```

Summary comment on Intent with Better Style

```
{ find the command-word terminator }

FoundTheEnd      := false;
MaxCommandLength := Length( InputStr );
Index            := 1;

while ((not FoundTheEnd) and
      (Index <= MaxCommandLength)) begin

   if ( InputStr[ Index ] = '$' ) then
      FoundTheEnd := True;
   else
      Index := Index + 1;
end;
```

Commenting Data Declarations

Comment the units of numeric data

Comment the range of allowable numeric values

Comment coded meanings

```
var
   CursorX:   1..MaxCols;       { horizontal screen position of cursor }
   CursorY:   1..MaxRows;       { vertical position of cursor on screen }

   AntennaLength:   Real;       { length of antenna in meters: >= 2 }
   SignalStrength: Integer;     { strength of signal in kilowatts: >= 1 }

   CharCode:  0..255;      { ASCII character code }
   CharAttib:  Integer;    { 0=Plain; 1=Italic; 2=Bold  }
   CharSize:   4..127;     { size of character in points }
```

Comment limitations on input data

Document flags to the bit level