

Homework 3 Assignment:
*Develop an Estimate
for the Next Generation
Travel Processing
Server (NGTPS)*

Due by 5:00pm, Tuesday, September 25th, 2012



Outline

- **NGTPS Context**
- **NGTPS System Architecture**
- **NGTPS COCOMO II estimate Information**

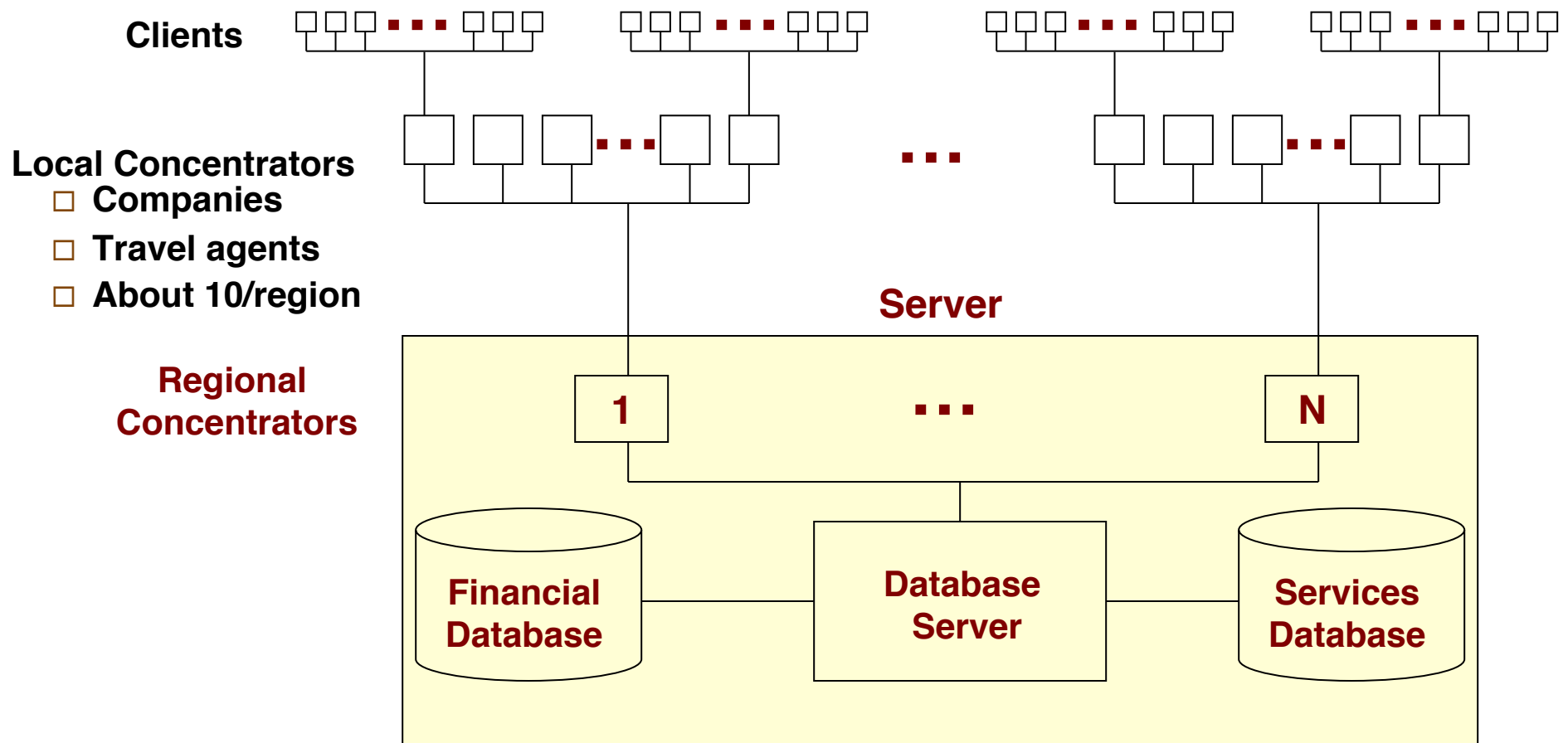


NGTPS Context

- Provides travel reservations for air, rail, car, and hotel
- Current system inadequate for growing workload
 - Current performance: 1000 transactions/second (tr/sec)
 - Need 2000 tr/sec now
 - Will need 4000 tr/sec by next year
- Need new Travel Processing Server
 - Client software is fine “as is”



NGTPS System Architecture





NGTPS Concept of Operations

- Clients prepare and send travel-itinerary requests to local concentrator
 - Package of air, rail, car, hotel reservation requests
- Local concentrators validate requests and forward them to regional concentrators at server
 - Usually about 10 local concentrators per region
- Number of Regional concentrators use **Database** server to develop best-match travel itinerary package
 - Send back to clients via local concentrators
 - Multiprocessor overhead due to resource contention, coordination



NGTPS Software Capabilities

Client Software	Server Software
<p><u>Systems functions</u></p> <ul style="list-style-type: none">▪ Command processing▪ Communications▪ Protocol conversion▪ Security and integrity controls▪ Utilities <p><u>User applications</u></p> <ul style="list-style-type: none">▪ Report generation▪ Screen processing▪ Transaction processing<ul style="list-style-type: none">• Authentication• Receipt and display▪ User applications▪ <u>Fault diagnosis</u>▪ Built-in testing▪ Fault isolation and recovery management	<p><u>Systems functions</u></p> <ul style="list-style-type: none">▪ Command processing▪ Communications▪ Protocol conversion▪ Security and integrity controls▪ Resource management▪ Utilities/libraries <p><u>Query processing</u></p> <ul style="list-style-type: none">▪ Database management▪ File management▪ Persistent database management <p><u>Status monitoring</u></p> <ul style="list-style-type: none">▪ Checksum processing <p><u>Fault diagnosis</u></p> <ul style="list-style-type: none">▪ Built-in testing▪ Fault isolation and recovery management

Note: While the NGTPS has a lot of capabilities listed above, you need only estimate System Functions, Query Processing, Status Monitoring, and Fault Diagnosis.



Sizing for NGTPS (Server only)

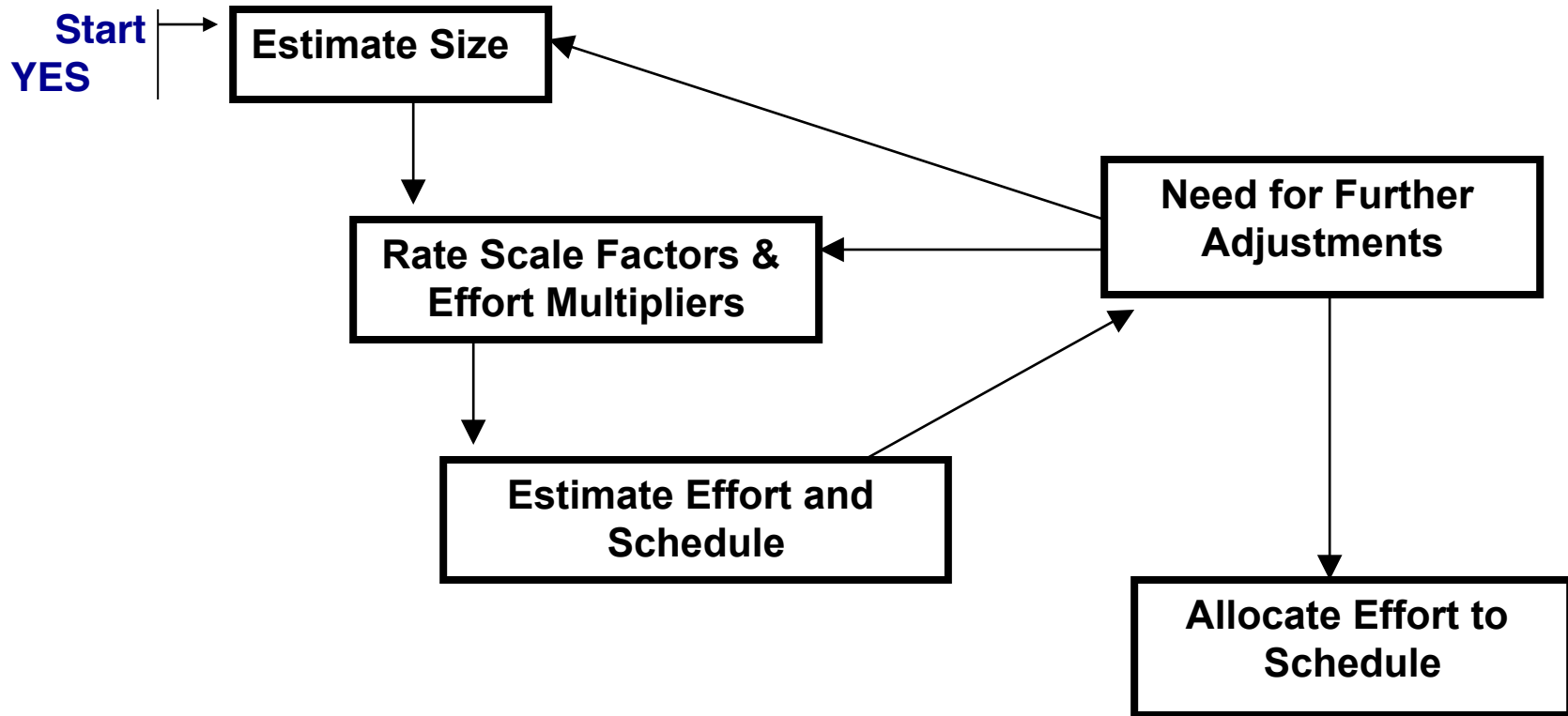
- **Estimates are for server software**
 - Not including client software

- **Reused software:**
 - Built-in testing
 - Fault isolation and recovery management

- **Size estimates**
 - Systems Functions: 190,000 SLOC new software
 - Status Monitoring: 40,000 SLOC new software
 - Query Processing: 10,800 SLOC new software
 - Fault diagnosis:
 - 180,000 SLOC new software;
 - *10,900 SLOC reused software



COCOMO II Estimate Scenario Flow





Scale Factor Ratings and Rationale

Scale Factor	Rating	Rationale
PREC	High	The organization seems to understand the project's goals and have considerable experience in working related systems.
FLEX	High	Because this is an organization in the midst of a process improvement program, we assumed that there is general conformity to requirements and a premium placed on delivering an acceptable product on time and within cost.
RESL	High	We assumed and checked that attention placed on architecture and risk identification and mitigation is consistent with a fairly mature process.
TEAM	Very High	This is a highly cooperative customer-developer team so far. It isn't distributed and seems to work well together.
PMAT	Nominal	A level 2 rating on the Software Engineering Institute's Capability Maturity Model (CMM) scale is nominal.



Product Cost Driver Ratings and Rationale

Cost Drivers	Rating	Rationale
RELY	Nominal	Potential losses seem to be easily recoverable and do not lead to high financial losses.
DATA	Nominal	Because no database information was provided, we have assumed a nominal rating. We should check this with the client to make sure.
CPLX	Nominal	Based upon the guidelines in Table 20 in the COCOMO II Model Definition Manual and the available infrastructure software, we assume TPS software to be nominal with the exception of the fault diagnosis software. We would rate this module “high” because of the added complexity introduced by the neural network algorithms.
RUSE	Nominal	Again, we assumed nominal because we did not know how to rate this factor.
DOCU	Nominal	We assume the level of required documentation is right-sized to the life-cycle needs of the project. This seems to be an inherent characteristic of using the organization’s preferred software process.



Platform Cost Driver Ratings and Rationale

Cost Drivers	Rating	Rationale
TIME	Nominal	Execution time is not considered a constraint.
STOR	Nominal	Main storage is not considered a constraint.
PVOL	Nominal	By its nature, the platform seems stable. The rating was selected because it reflects normal change characteristics of commercially available operating environments.



Personnel Cost Driver Ratings & Rationale

Cost Drivers	Rating	Rationale
ACAP	High	We have commitments to get some of the highest ranked analysts available. However, the mix of personnel will be such that we can assume “high” as the norm for the project.
PCAP	Nominal	Unfortunately, we do not know who we will get as programmers. Therefore, we assumed a nominal rating.
PCON	High	Turnover in the firm averaged about 3% annually during the past few years. We have doubled this figure to reflect assumed project turnover, based on usual project experience of the firm.
APEX	High	Most of the staff in the organization will have more than 3 years of applications experience in transaction processing systems.
LTEX	Nominal	Because of the Java/C/C++ uncertainties, we will assume the experience level with languages & tools is between 1 and 2 years.
PLEX	High	The mix of staff with relevant platform experience is high as well based on the information given about the project (more than 3 years of experience).



Project Cost Driver Ratings and Rationale

Cost Drivers	Rating	Rationale
TOOL	High	We assume that we will have a strong, mature set of tools that are moderately integrated.
SITE	Low	Because we don't know how to rate this factor, we have conservatively assumed Low for now.
SCED	Nominal	We will adjust this factor to address the schedule desires of management after the initial estimates are developed.

Your Assignment

- Using the information in the previous pages and the COCOMO-II software, generate an estimate like the one depicted below (example from Boehm Text).
- The development model should reflect that the architecture exists.
- The language should be Java for Query Processing and C++ for the rest.
- Please summarize your approach and assumptions for the estimate.

USC-COCOMO II.2000.0 - C:\USC_COCOMO\TPS.est

File Edit View Parameters Calibrate Phase Maintenance Help

Project Name: Scale Factor Schedule

Development Model:

X	Module Name	Module Size	LABOR Rate (\$/month)	ERF	Language	NOM Effort DEV	EST Effort DEV	PROD	COST	INST COST	Staff	RISK
	System-Reuse	A:1900	0.00	0.60	C	6.5	3.9	484.0	0.00	0.0	0.3	0.0
	System-New	S:18000	0.00	0.60	C	61.9	37.2	484.0	0.00	0.0	2.5	0.0
	Applications	S:800	0.00	0.60	C	2.8	1.7	484.0	0.00	0.0	0.1	0.0
	Diagnosis	F:24000	0.00	0.60	Third Generat	82.5	49.6	484.0	0.00	0.0	3.4	0.0

	Estimated	Effort	Sched	PROD	COST	INST	Staff	RISK
Total Lines of Code: <input type="text" value="44700"/>	Optimistic	73.9	13.7	604.9	0.00	0.0	5.4	
	Most Likely	92.4	14.7	484.0	0.00	0.0	6.3	0.0
	Pessimistic	115.5	15.7	387.2	0.00	0.0	7.3	

Project File : C:\USC_COCOMO\TPS.est Is Loaded