End-To-End Scaling: The Response Time Pipe

CMG2001 Session 3208, December 4, 2001 http://www.simalytic.com/CMG01/3208ppt.pdf

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What's the Problem

Background

The Response Time Pipe Solution

• Techniques that fit the problem

Response Time Pipe Example

• Sample solution to a hypothetical situation



How does the performance of a computer application effect the business?

- Defining the relationship between the two:
 - The business result when the application changes
 - The application result when the business changes
- What is the "effect"?
 - Requires measuring both
- Implies there is a "good" and a "bad"
 - Assessment of the relationship
 - How to predict when it will become "bad"?
- How to use performance numbers to answer business (i.e., financial) questions?



Measure the "effect" Measure the Pieces

- Measuring the application
 - Different types of applications
 - ▲ Fat/thin client, multi-tier, web based, proprietary, ...
 - Different units of work
 - ▲ Transactions, messages, interactive, asynchronous, ...
 - What is the end-user's experience?
 - Measure everything or just what's "important"?



Measure the "effect" Measure the Pieces

- Measuring the infrastructure
 - Different types of components
 - ▲ Clients, servers, networks, other, ...
 - ▲ How many to measure?
 - ▲ Which ones to measure?
 - Different types of tools
 - Each specific to some components
 - Different types of metrics
 - Created by specific tools



Measure the "effect" Measure the Business

- Measuring the response time
 - Component response times lack continuity
 - Pitfall: viewing the magnitude of the component change as the magnitude of the business change
 - End-to-end response times lack enough detail
 - Hard to correlate ETE-RT across components
- Measuring the through-put
 - Ignores end-user satisfaction
- Measuring the revenue
 - Doesn't relate to performance metrics



When is the effect "bad"?

- Performance metrics neither good nor bad
- Relationship to the business provides the context
 - The degree of "bad" depends on the impact to the business when objectives are missed.
 - The cost of fixing the performance problem is weighed against the cost of missing the objective:
 \$10,000 to fix the problem that costs \$1 a day
 \$1,000,000 to fix the problem that costs \$10,000 a day



Predicting when the effect will be "bad"

- Many techniques:
 - Trends, models, load tests, over provisioning, ...
- Cannot invest as much time and effort
 - Inexpensive commodity components
 - Too many components (across many organizations)
 - Rapid changes in markets
- Throw hardware at the problem
 - May not need a precise answer but do need a target
- What to do about it?
 - What is the impact from the key components?



What's Needed in a Solution?

• Need an approximation technique

- Easy to use without years of experience
- Identifies areas of concern
- Eliminates areas that don't matter (right now)
- Usable results quickly enough for business decisions
- Need a technique to tie all the measurement pieces together, regardless of sources
- Need a technique to relate the overall result to the business but still identify key components
 Provides focus for existing analysis techniques



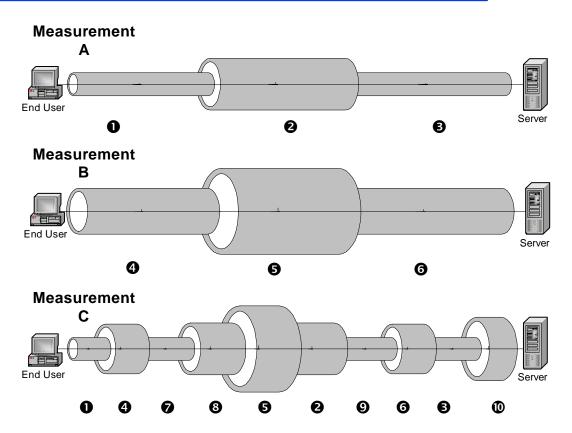
• What is a Response Time Pipe?

- Way to visualize the relationships between components used by an application.
- A technique that quickly connects different types of component performance measurements or approximations.
- A technique to relate the performance of the components to the business objective.

Response Time Pipe Solution

Why a Pipe?

- To provide a visual framework that expresses:
 - Capacity
 - Connection
 - Flow
 - Sections
 - Constrictions



 Looking at different sections provides different perceptions of capacity and performance



How to Build an RTP

- Identify a unit of business work (transaction)
- Establish the overall objective
- Measure the overall response time
- Divide the infrastructure into sections
- Identify the transaction flow across the sections
- Measure each section with appropriate metrics
- Map the metrics to transaction response times
- Connect the response times from all sections

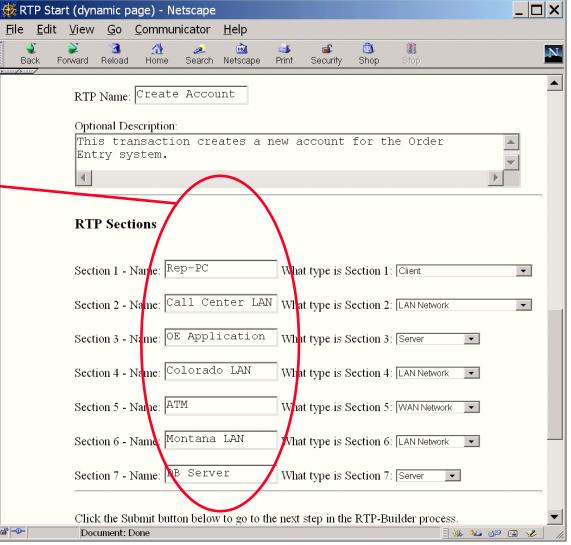


Hypothetical Situation and Infrastructure

- Operators service customers in a call center
- Simple Create Account Transaction
- Multi-tier infrastructure
 - Client PC
 - Call Center LAN
 - Order Entry Application Server
 - Network segments (LAN \rightarrow WAN \rightarrow LAN)
 - Database Sever

 Define each section of the RTP

- Name
- Type of section
 - Client
 - Server
 - LAN
 - WAN



- Define each section of the RTP
 - Name

(IIII)

- Type of section-
 - Client
 - Server
 - LAN
 - WAN

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Section 3 - Name: OE Application What type is Section 3: Server	
Section 4 - Name: Colorado LAN What type is Section -: LAN Network	
Section 5 - Name: ATM What type is Section 5 WAN Network	
Section 6 - Name: Montana LAN What type is Section 6: LAN Network	□ / -
Section 7 - Name: DB Server What type is Section 7: Selver	
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- Define each section of the RTP
 - Name

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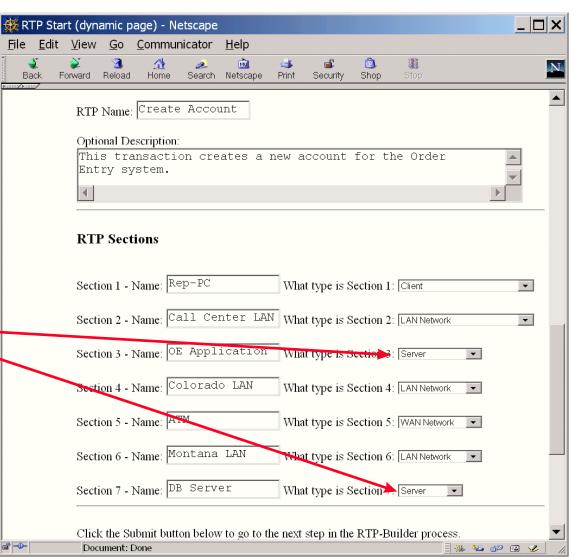
- Type of section
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- Define each section of the RTP
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- Type of section
 - Client
 - ServerLAN
 - WAN



- Define each section of the RTP
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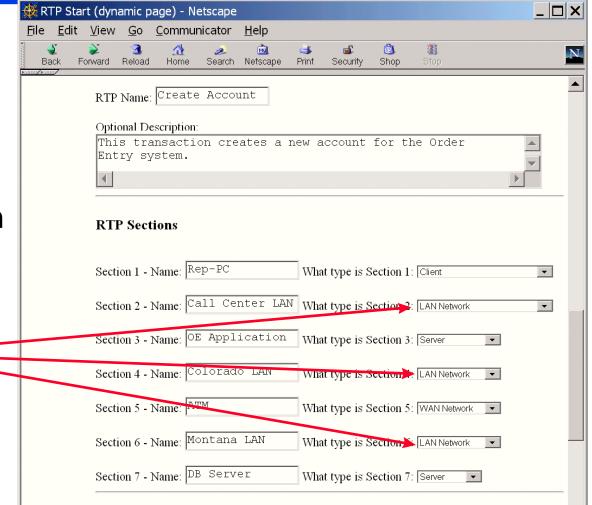
- Type of section
 - Client

WAN

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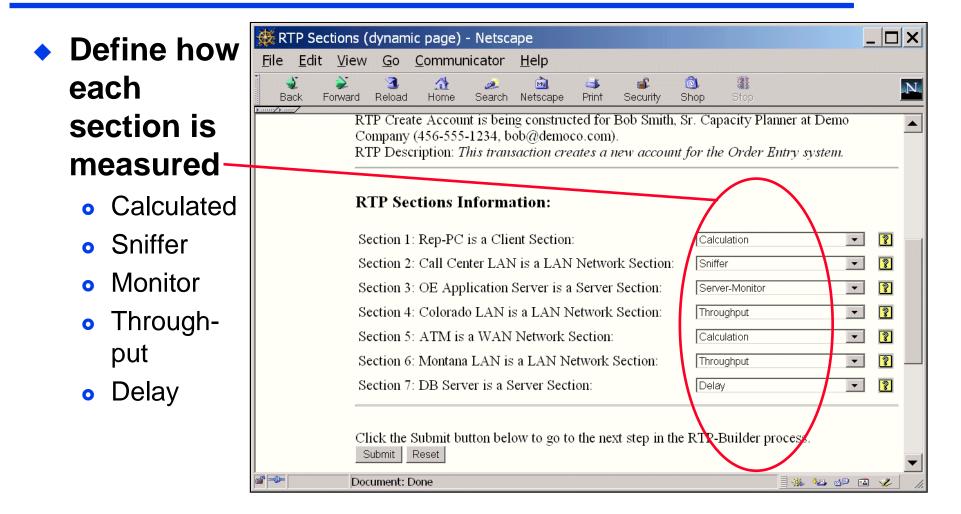
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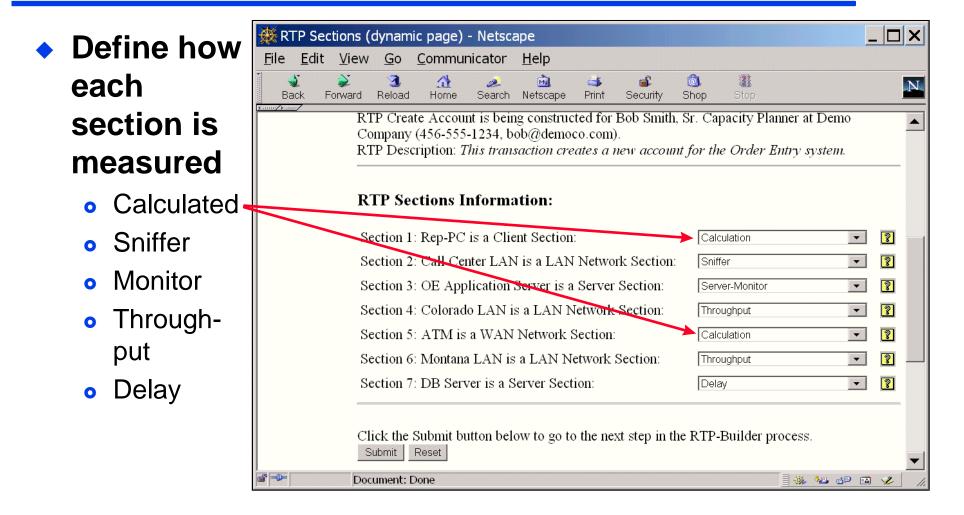
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- Type of section
 - Client
 - Server
 - LAN
 - WAN -

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	Section 2 - Name: Call Center LAN What type is Section 2: LAN Network Section 3 - Name: OE Application What type is Section 3: Server
	Section 4 - Name: Colorado LAN What type is Section 4: LAN Network
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	Section 6 - Name: Montana LAN What type is Section 6: LAN Network
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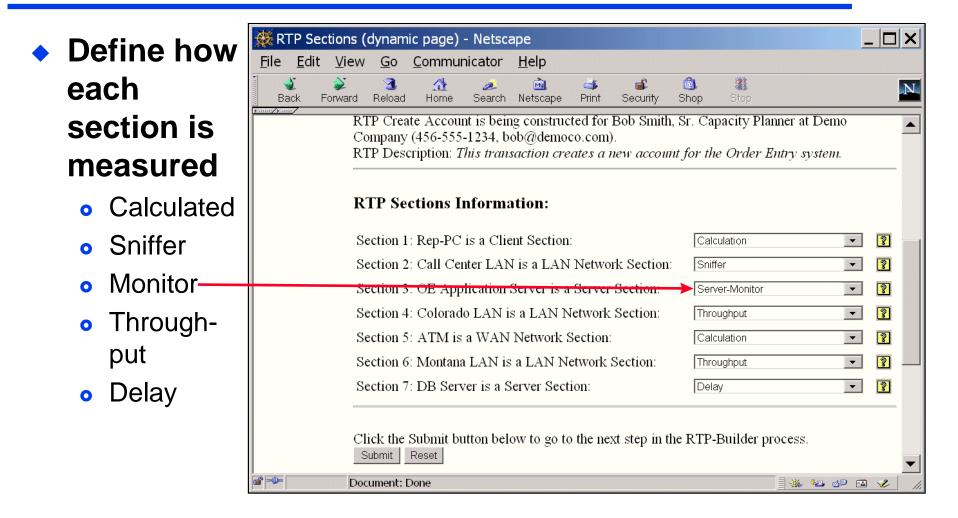


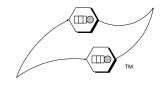


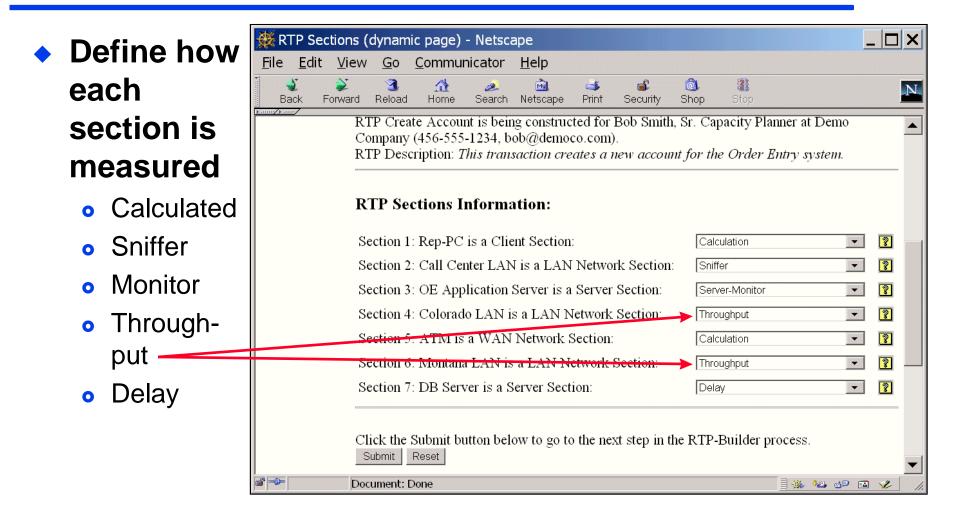


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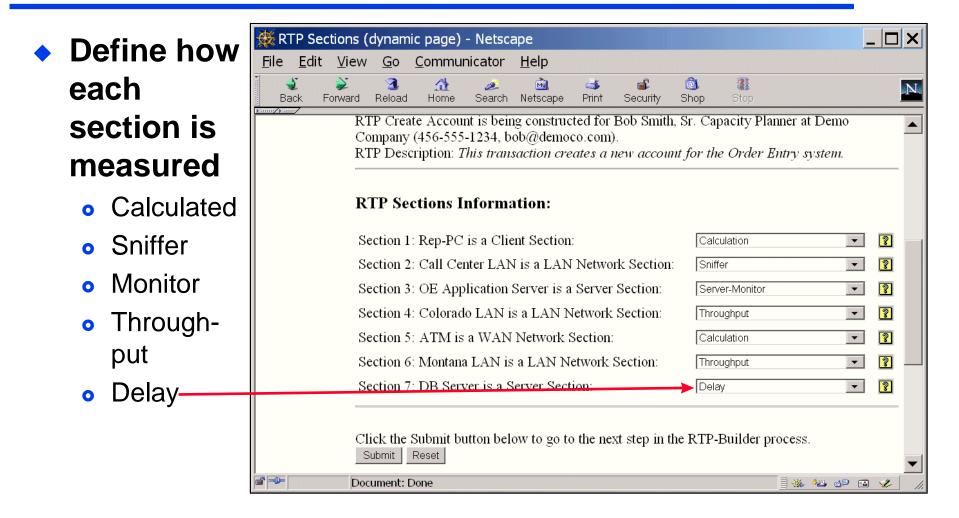










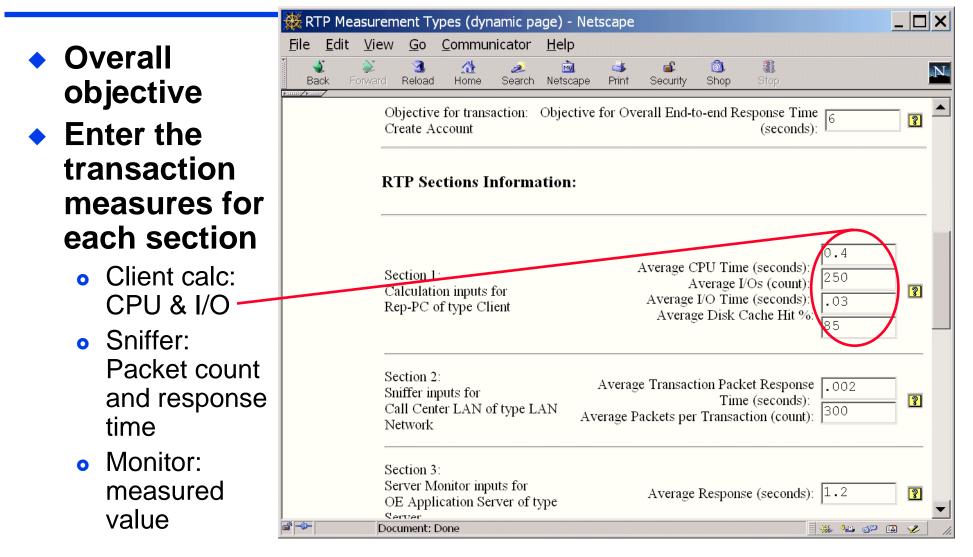


 Overall objective
 Enter the transaction measures for each section
 Client calc: CPU & I/O

- Sniffer: Packet count and response time
- Monitor: measured value

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 Overall objective
 Enter the transaction measures for each section Fil

- Client calc: CPU & I/O
- Sniffer: Packet count and response time
- Monitor: measured value

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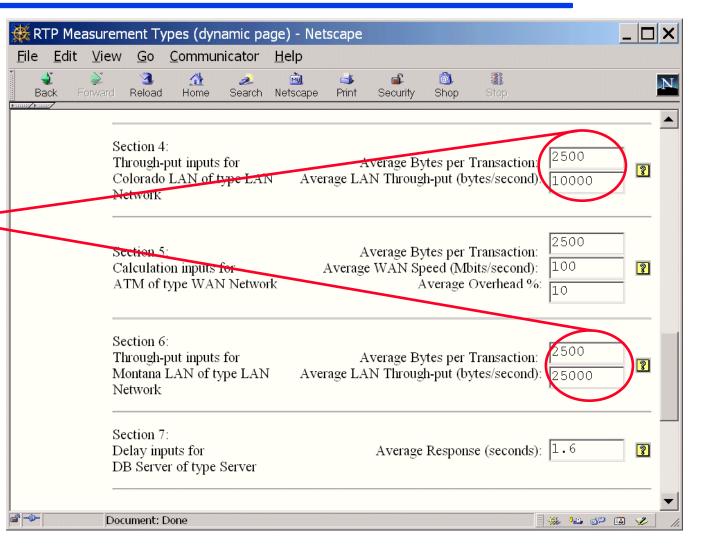
 Overall objective
 Enter the transaction measures for each section Fi

- Client calc: CPU & I/O
- Sniffer: Packet count and response time
- Monitor: measured value

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D =	Section 3: Server Monitor inputs for OE Application Server of type Server Document: Done	Average R	esponse (seconds):	

 Enter the transaction measures for each section

- Through-put:
 bytes and through-put
- WAN calc: bytes, speed and overhead
- Delay: value



 Enter the transaction measures for each section

- Through-put: bytes and through-put
- WAN calc: bytes, speed and overhead
- Delay: value

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	Section 6: Through-put inputs for Average Bytes per Transaction: 2500 Montana LAN of type LAN Average LAN Through-put (bytes/second): 25000 Network	?	
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 Enter the transaction measures for each section

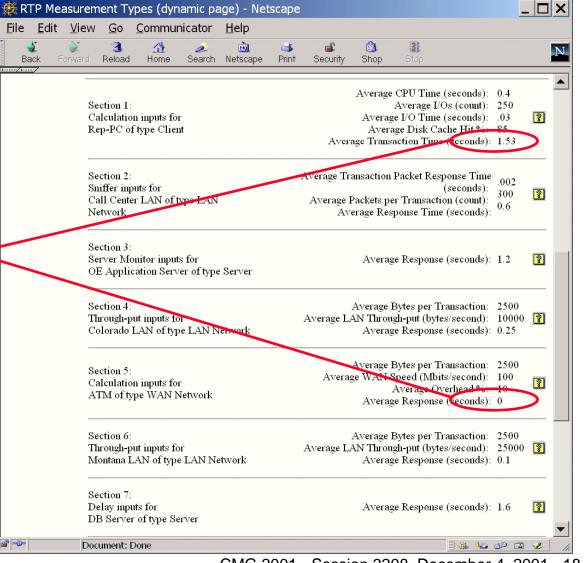
- Through-put: bytes and through-put
- WAN calc: bytes, speed and overhead
- Delay:
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Section 7: Delay inputs for Average Response (seconds) 1.6 DB Server of type Server	
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 Calculate the transaction response times for each section

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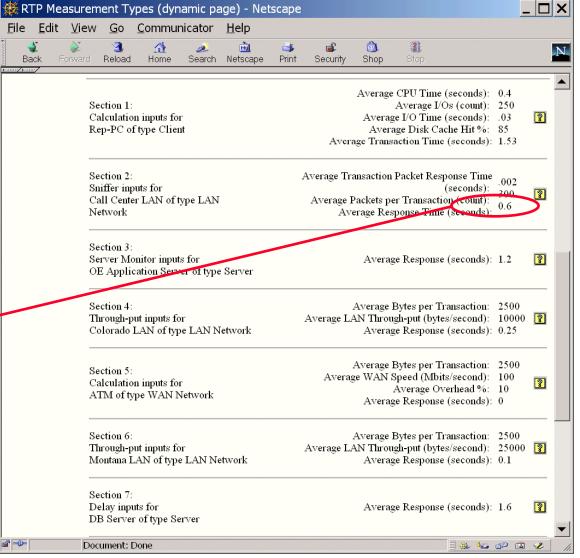
- Calc: add the component times
- Sniffer: packet response time * count
- Monitor: value
- Through-put: based on total bytes
- Delay: value



 Calculate the transaction response times for each section

TIC

- Calc: add the component times
- Sniffer: packet response_ time * count
- Monitor: value
- Through-put: based on total bytes
- Delay: value



- Calculate the transaction response times for each section
 - Calc: add the component times

File

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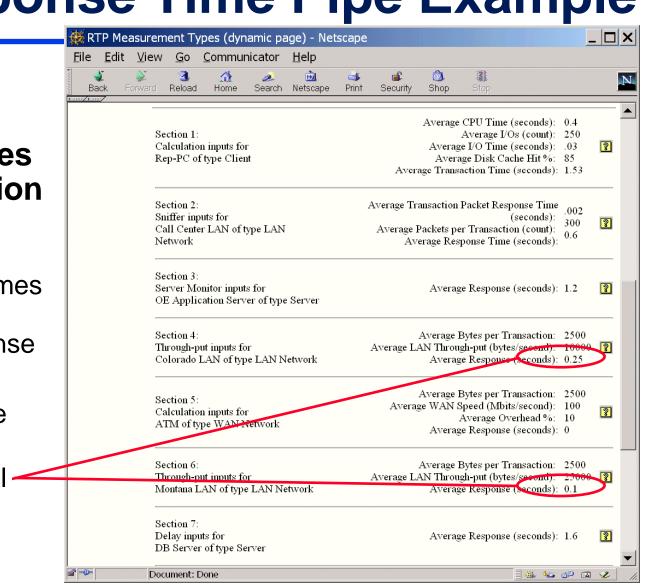
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- Monitor: value -
- Through-put: based on total bytes
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Network Averag	ge Response Time (seconds): 0.0	
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	Average Response (seconds): 1.6	3
DB Server of type Server		
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 Calculate the transaction response times for each section

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- Calc: add the component times
- Sniffer: packet response time * count
- Monitor: value
- Through-put: based on total
 bytes
- Delay: value



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Average Transaction Packet Response Time 002

Average Response Time (seconds):

Average Packets per Transaction (count):

Average CPU Time (seconds): 0.4

Average I/O Time (seconds): .03

Average Disk Cache Hit %: 85 Average Transaction Time (seconds): 1.53

Average I/Os (count): 250

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Section 3:

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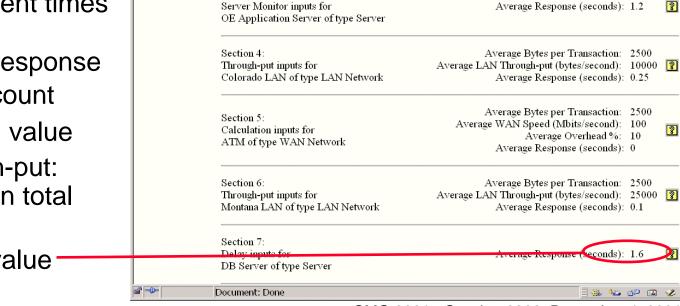
Rep-PC of type Client

Call Center LAN of type LAN

 Calculate the transaction response times for each section

TIC

- Calc: add the component times
- Sniffer: packet response time * count
- Monitor: value
- Through-put: 0 based on total bytes
- Delay: value



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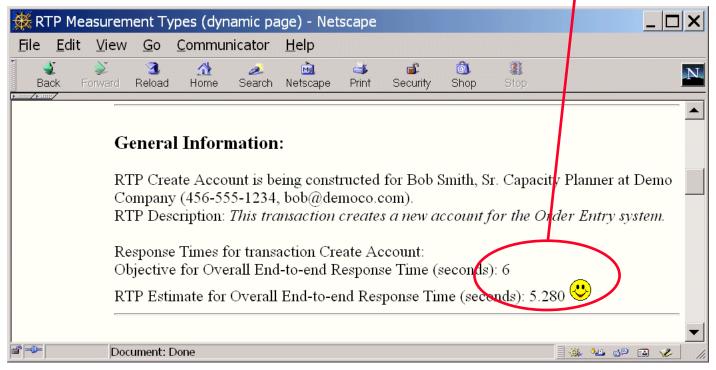
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Compare the estimate to the objective

- First indicator of "goodness" or "badness"
 - "Best case" estimate of transaction response time



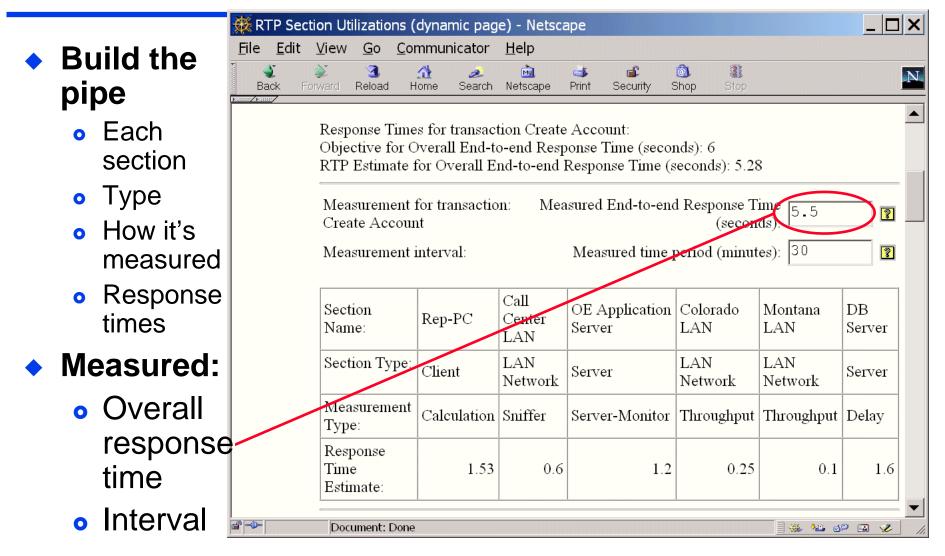
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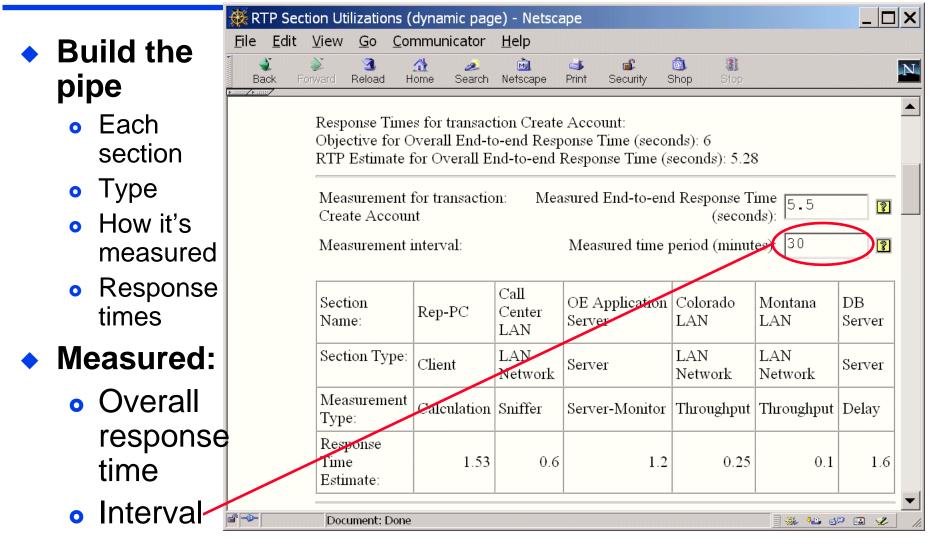
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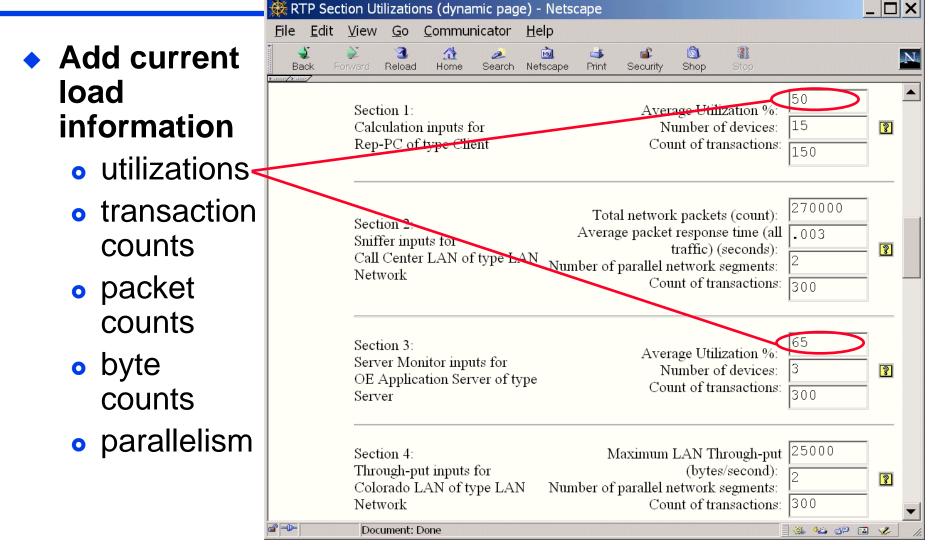
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 Response times 		Section	Rep-PC	Call Center	OE Application		Montana	DB
		Name:	-	LAN	Server	LAN	LAN	Server
Measured:		Section Type:	Client	LAN Network	Server	LAN Network	LAN Network	Server
 Overall 	\mathbf{i}	Measurement Type:	Calculation	Sniffer	Server-Monitor	Throughput	Throughput	Delay
response time		Response Time	1.53	0.6	1.2	0.25	0.1	1.6
		Estimate:						
 Interval 		Document: Done						

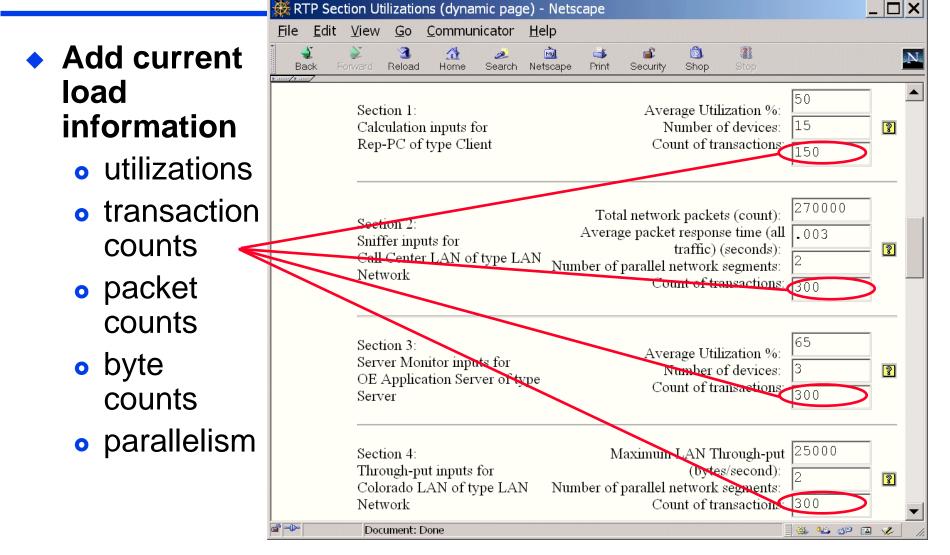


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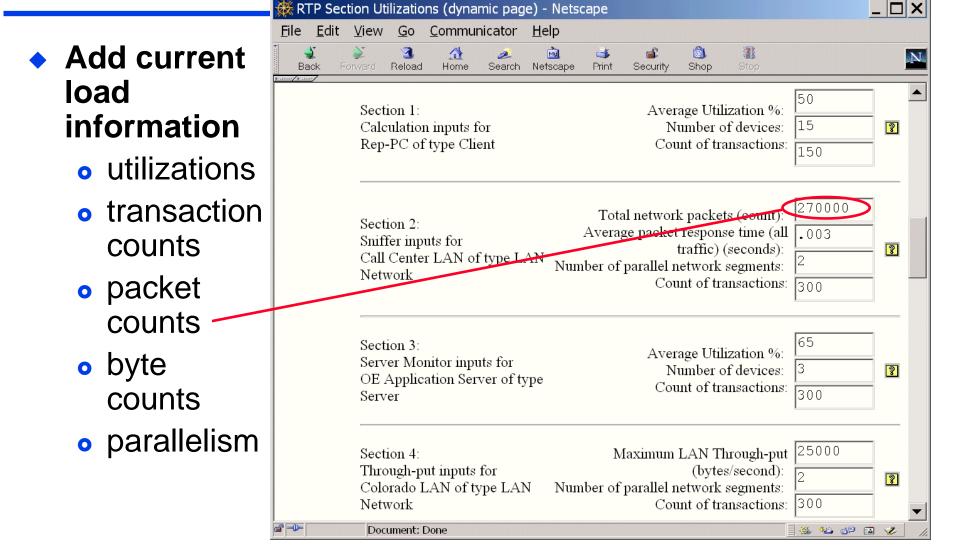


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ПС



File Edit View Go Communicator Help Add current 0 7 My. 4 rf C ø. N Back Reload Home Search Netscape Print Shop Security load 50 Section 1: Average Utilization %: information 15 Calculation inputs for Number of devices: 8 Rep-PC of type Client Count of transactions: 150 utilizations transaction 270000 Total network packets (count): Section 2: Average packet response time (all .003 Sniffer inputs for counts traffic) (seconds): 8 Call Center LAN of type LAN Number of parallel network segments: Network packet Count of transactions: 300 counts 65 Section 3: Average Utilization %: • byte Server Monitor inputs for Number of devices: 8 3 OE Application Server of type Count of transactions: counts 300 Server • parallelism Maximum LAN Through put 2500 Section 4: Through-put inputs for (bytes/second): ? Colorado LAN of type LAN Number of parallel network segments: 300 Network Count of transactions: Document: Done 🍇 🛂 🗗 🖾 🏑

RTP Section Utilizations (dynamic page) - Netscape

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Help

Add current ô. 7 My. 4 rf C 2 N Back Reload Search Netscape Print Shop Home Security load 50 Average Utilization %: Section 1: information Number of devices 15 Calculation inputs for 8 Rep-PC of type Client Count of transactions: 150 utilizations transaction 270000 Total network packets (count): Section 2: Average packet response time (all .003 Sniffer inputs for counts traffic) (seconds); 3 Call Center LAN of type LAN Number of parallel network segments: Network Count of transactions: 300 packet counts 65 Section 3 Average Utilization %: byte Server Monitor inputs for 8 Number of devices: 3 E Application Server of type Count of transactions: 300 counts Server parallelism 25000 Maximum LAN Through-put Section 4 Through-put inputs for (bytes/second) 8 Number of parallel network segments: Colorado LAN of type LAN Network Count of transactions: 300 Document: Done 🛛 🔆 🚣 🚽 🖾 🌾

RTP Section Utilizations (dynamic page) - Netscape

Communicator

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_ 🗆 X 🔆 RTP Section Utilizations (dynamic page) - Netscape File Edit View Go Communicator Help Calculations Ô, 7 My. 4 rfî. 2 N Back Reload Home Search Netscape Print Security Shop for each Count of transactions: 150 Transaction Response Time: 1.53 Section 1: Average CPU Utilization for Transactions. section ? Calculation inputs for Number of devices: 15 Rep-PC of type Client Transactions per device: 10 Transactions per device per minute: 0.33 • New Average Utilization: 50 % transaction Count of transaction Transaction Response Time (seconds): 0.6 Average Packets per Transaction (count): 500 response Average Transaction Packet Response Time (seconds): .002 Section 2: Average Utilization for Transactions: 5 % times 3 Sniffer inputs for Number of parallel network segments (count): 2 Call Center LAN of type LAN Network Transactions per parallel network segment per minute: 5 Total network packets (count): 270000 Transaction 0 Average Segment Packet Response Time (seconds): .003 Average Segment Utilization: 45 % workload ount of transactio Transaction Response Time: 1.2 utilization Section 3: Average Utilization for Transactions: 6.60 Server Monitor inputs for 3 Number of devices: 3 OE Application Server of type Server Transactions per device: 100 Overall Transactions per device per minute: 3.33 Average Utilization for Server: 65 % utilization Count of transactions: 200 Transaction Response Time: 0.25 Average Bytes per Transaction. 25 Accounts for Average Utilization for Transactions: 0.83 Section 4: ? Through-put inputs for Number of parallel network segments: 2 effect of Colorado LAN of type LAN Network Maximum LAN Through-put (bytes/second): 25000 Average LAN Through-put (bytes/second): 10000 Transactions per parallel network segment per minute: 5 current load Average Segment Utilization: 40 % r -0-Document: Done 🏽 🐝 🛂 🗗 🖬 🎸

_ 🗆 X 🔆 RTP Section Utilizations (dynamic page) - Netscape File Edit View Go Communicator Help Calculations Ô, 2 My. 4 rfî. 2 N Back Reload Home Search Netscape Print Security Shop for each Count of transactions: 150 Transaction Response Time Average CPU Utilization for Transactions: 0.22 % Section 1: section Number of devices. 1. 2 Calculation inputs for Rep-PC of type Client Transactions per device: 10 Transactions per device per minute: 0.33 • New Average Utilization: 50 % transaction Count of transactions: 300 Transaction Response Time (seconds): 0.6 Average Packets per Transaction (count): 300 response Average Transaction Packet Response Time (seconds): 002 Section 2: Average Utilization for Transactions: 5 % times 3 Sniffer inputs for Number of parallel network segments (count). Call Center LAN of type LAN Network Transactions per parallel network segment per minute: 5 Total network packets (count): 270000 Transaction 0 Average Segment Packet Response Time (seconds): .003 Average Segment Utilization: 45 % workload Count of transactions: 300 Transaction Response Time: 1.2 utilization Section 3: Utilization for Transactions: 6.66 % Number of devices Server Monitor inputs for Transactions per device: 100 DE Application Server of type Server Overall Transactions per device per minute: 3.33 Average Utilization for Server: 65 % utilization Count of transactions: 300 Transaction Response Time: 0.25 Average Bytes per Transaction: 2500 Accounts for Average Utilization for Transactions: 0.83 Section 4: Through-put inputs for Number of parallel network segments: 2 effect of Maximum LAN Through-put (bytes/second): 25000 Colorado LAN of type LAN Network Average LAN Through-put (bytes/second): 10000 Transactions per parallel network segment per minute: 5 current load Average Segment Utilization: 40 % ***** -**D**-Document: Done 🏽 🐝 🛂 🗗 🖬 🎸

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_ 🗆 X 🔆 RTP Section Utilizations (dynamic page) - Netscape File Edit View Go Communicator Help Calculations Ô, 7 My. 4 rfî. 2 N Back Reload Home Search Netscape Print Security Shop for each Count of transactions: 150 Transaction Response Time: 1.53 section Section 1: Average CPU Utilization for Transactions: 0.22 % ? Calculation inputs for Number of devices: 15 Rep-PC of type Client Transactions per device: 10 Transactions per device per minute. • New Average Unization: 50 % transaction Count of transactions: 300 Transaction Response Time (seconds): 0.6 Average Packets per Transaction (count): 300 response Average Transaction Packet Response Time (seconds): .002 Section 2: Average Utilization for Transactions: 5 % times ? Sniffer inputs for Number of parallel network segments (count): 2 Call Center LAN of type LAN Network Transactions per parallel network segment per minute: 5 Total network packets (count): 270000 Transaction 0 Average Segment Packet Response Time (seconds): 003 Average Segment Utrazation: 45 % workload Count of transactions: 300 Transaction Response Time: 1.2 utilization ction 3: Average Utilization for Transactions: 6.66 % 3 Server Monitor inputs for Number of devices: 3 OE Application Server of type Server Transactions per device: 100 Overall Transactions per device per minute: 3 33 0 Average Utilization for Server: 65 % utilization Count of transactions: 300 Transaction Response Time: 0.25 Average Bytes per Transaction: 2500 Accounts for Section 4: Average Utilization for Transactions: 0.83 ? Through-put inputs for Number of parallel network segments: 2 effect of Colorado LAN of type LAN Network Maximum LAN Through-put (bytes/second): 25000 Average LAN Through-put (bytes/second): 10000 Transactions per parallel network segment per minut current load Average Segment Utilization: 40 % **s** - D-Document: Done 🏽 🔆 🚣 🗗 🖾 🎸

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- Add to pipe:
 - Trans workload utilization
 - Overall utilization

Compare:

- Objective
- Estimate
- Actual

Conclusions based on relationships

Reload Print Search Netscape Measurement Interval (minutes): 30 Response Times for transaction Create Account: Objective for Overall End-to-end Response Time (seconds): 6 RTP Estimate for Overall End-to-end Response Time (seconds): 5.28 Actual Measurement of Overall End-to-end Response Time (seconds): 5.5

Help

My

🔆 RTP Section Utilizations (dynamic page) - Netscape

Home

Go

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Communicator

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The RTP estimated response time is less than the response time objective, which means it is possible for the transaction to meet the business needs. Additional analysis is needed to understand the effects of queuing and interference from other workloads.

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Shop

Security

igoplus The measured response time is greater than the response time estimate, which means the estimate probably reflects the minimal transaction time and the measured time includes queuing and interference from other workloads and the RTP predictive steps can use the estimate for the transaction service time.

The measured response time is less than the response time objective, therefore this RTP will probably accept more transaction traffic.

	Section Name:	Rep-PC	Call Center LAN	OE Application Server	Colorado LAN	Montana LAN	DB Server		
	Section Type:	Client	LAN Network	Server	LAN Network	LAN Network	Server		
	Measurement Type:	Calculation	Sniffer	Server-Monitor	Throughput	Throughput	Delay		
	Response Time Estimate:	1.53	0.6	1.2	0.25	0.1	1.6		
1	Section Utilization Estimate:	50 %	45 %	65 %	40 %	50 %	n/a %		
	Section Utilization by Transaction Estimate:	0.22 %	5 %	6.66 %	0.83 %	0.42 %	n/a %	-	
D	Document: Done								

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Help

My

🔆 RTP Section Utilizations (dynamic page) - Netscape

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Communicator

2

- Add to pipe:
 - Trans workload utilization
 - Overall utilization

Compare:

- Objective
- Estimate
- Actual

Conclusions based on relationships

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 Reload
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 Netscape
 Print
 Security
 Shop
 Stop

 Measurement Interval (minutes): 30
 Response Times for transaction Create Account:
 Objective for Overall End-to-end Response Time (seconds): 6
 RTP Estimate for Overall End-to-end Response Time (seconds): 5.28

 Actual Measurement of Overall End-to-end Response Time (seconds): 5.5
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The RTP estimated response time is less than the response time objective, which means it is possible for the transaction to meet the business needs. Additional analysis is needed to understand the effects of queuing and interference from other workloads.

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- The measured response time is greater than the response time estimate, which means the estimate probably reflects the minimal transaction time and the measured time includes queuing and interference from other workloads and the RTP predictive steps can use the estimate for the transaction service time.
- Other measured response time is less than the response time objective, therefore this RTP will probably accept more transaction traffic.

	Section Name:	Rep-PC	Call Center LAN	OE Application Server	Colorado LAN	Montana LAN	DB Server	
	Section Type:	Client	LAN Network	Server	LAN Network	LAN Network	Server	
	Measurement Type:	Calculation	Sniffer	Server-Monitor	Throughput	Throughput	Delay	
	Response Time Estimate:	1.53	0.6	1.2	0.25	0.1	1.6	
	Section Utilization Estimate:	50 %	45 %	65 %	40 %	50 %	n/a %	
ł	Section Utilization by Transaction Estimate:	0.22 %	5 %	6.66 %	0.83 %	0.42 %	n/a %	-
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- Add to pipe:
 - Trans workload utilization
 - Overall utilization

• Compare:

- Objective
- Estimate
- Actual
- Conclusions based on relationships

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 Reload
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 Measurement Interval (minutes): 30
 Response Times for transaction Create Account:
 Objective for Overall End-to-end Response Time (seconds): 6
 RTP Estimate for Overall End-to-end Response Time (seconds): 5.28
 Actual Measurement of Overall End-to-end Response Time (seconds): 5.5

Help

My

🔆 RTP Section Utilizations (dynamic page) - Netscape

Go

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File Edit View

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Communicator

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The RTP estimated response time is less than the response time objective, which means it is possible for the transaction to meet the basiness needs. Additional analysis is needed to understand the effects of queuing and interference from oner workloads.

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The measured response time is greater than the response time estimate, which means the estimate probably reflects the minimal transaction time and the measured time includes queuing and interference from other workloads and the RTP predictive steps can use the estimate for the transaction service time.

• The measured response time is less than the response time objective, therefore this RTP will probably accept more transaction traffic.

Section Name:	Rep-PC	Call Center LAN	OE Application Server	Colorado LAN	Montana LAN	DB Server	
Section Type:	Client	LAN Network	Server	LAN Network	LAN Network	Server	
Measurement Type:	Calculation	Sniffer	Server-Monitor	Throughput	Throughput	Delay	
Response Time Estimate:	1.53	0.6	1.2	0.25	0.1	1.6	
Section Utilization Estimate:	50 %	45 %	65 %	40 %	50 %	n/a %	
Section Utilization by Transaction Estimate:	0.22 %	5 %	6.66 %	0.83 %	0.42 %	n/a %	•
Document: Done 📃 💥 🛀 💷 🖼 🥓 🏼 🌾							

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Print

Security

Help

Search Netscape

Objective for Overall End-to-end Response Time (seconds): 6

RTP Estimate for Overall End-to-end Response Time (seconds): 5.28 Actual Measurement of Overall End-to-end Response Time (seconds): 5.5

My

🔆 RTP Section Utilizations (dynamic page) - Netscape

Home

Measurement Interval (minutes): 30

Go

3

Reload

Section Name:

Section Type:

Response Time

Measurement Type:

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Communicator

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Response Times for transaction Create Account:

interference from other workleads.

accept more transaction traffic.

Rep-PC

Add to pipe:

- Trans workload utilization
- Overall utilization

Compare:

- Objective
- Estimate
- Actual

Conclusions based on relationships

LAN Client Server LAN Network | LAN Network | Server Network Calculation Sniffer Server-Monitor Throughput Throughput Delay 1.2 0.25 1.53 0.6 0.1 1.6

Colorado

LAN

Estimate:	1.55	0.0	1.2	0.23	0.1	1.0	
Section Utilization Estimate:	50 %	45 %	65 %	40 %	50 %	n/a %	
Section Utilization by Transaction Estimate:	0.22 %	5 %	6.66 %	0.83 %	0.42 %	n/a %	•
Document: Done						1P 🖬 🎸	1.

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Shop

The RTP estimated response time is tess than the response time objective, which means it is possible for the transaction to meet the business needs. Additional analysis is needed to understand the effects of queuing and

The measured response time is greater than the response time estimate, which means the estimate probably reflects the minimal transaction time and the measured time includes queuing and interference from other

🙂 The measured response time is less than the response time objective, therefore this RTP will probably

Server

OE Application

workloads and the RTP predictive steps can use the estimate for the transaction service time.

Call Center

LAN

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DB

Server

Montana LAN

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Print

Security

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Shop

The RTP estimated response time is less than the response time objective, which means it is possible for the transaction to meet the business needs. Additional analysis is needed to understand the effects of queuing and

The measured response time is greater than the response time estimate, which means the estimate probably reflects the minimal transaction time and the measured time includes queuing and interference from other

The measured response time is less than the response time objective, therefore this RTP will probably

OE Application

Server-Monitor

Server

Server

workloads and the RTP predictive steps can use the estimate for the transaction service time.

0.6

45 %

5%

Call Center

LAN

LAN

Calculation Sniffer

1.53

50 %

0.22 %

Network

Help

Search Netscape

Objective for Overall End-to-end Response Time (seconds): 6

RTP Estimate for Overall End-to-end Response Time (seconds): 5.28 Actual Measurement of Overall End-to-end Response Time (seconds): 5.5

My

🔆 RTP Section Utilizations (dynamic page) - Netscape

Home

Measurement Interval (minutes): 30

Go

3

Reload

File Edit View

5

Back

Communicator

-

Response Times for transaction Create Account:

interference from other workloads.

accept more transaction traffic.

Section Name:

Section Type:

Response Time

Estimate:

Estimate:

Document: Done

Measurement Type:

Section Utilization

Section Utilization by

Transaction Estimate:

Rep-PC

Client

Add to pipe:

- Trans workload utilization
- Overall utilization

• Compare:

- Objective
- Estimate
- Actual

 Conclusions based on relationships Colorado

Throughput

0.25

40 %

0.83 %

LAN

1.2

65 %

6.66%

 $-\Box \times$

DB

Server

Delay

1.6

n/a %

n/a %

0.1

50 %

0.42 %

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Montana LAN

LAN Network | LAN Network | Server

Throughput

• Add to pipe:

• Trans workload utilization 5

Back

Document: Done

 Overall utilization

Compare:

- Objective
- Estimate
- Actual

Conclusions based on relationships

 $-\Box \times$ 🔆 RTP Section Utilizations (dynamic page) - Netscape Communicator File Edit View Go Help 3 0 My ď, Reload Home Print Shop Search Netscape Security Measurement Interval (minutes): 30 Response Times for transaction Create Account: Objective for Overall End-to-end Response Time (seconds): 6 RTP Estimate for Overall End-to-end Response Time (seconds): 5.28 Actual Measurement of Overall End-to-end Response Time (seconds): 5.5 The RTP estimated response time is less than the response time objective, which means it is possible for the transaction to meet the business needs. Additional analysis is needed to understand the effects of queuing and interference from other workloads. The measured response time is greater than the response time estimate, which means the estimate probably reflects the minimal transaction time and the measured time includes queuing and interference from other workloads and the RTP predictive steps can use the estimate for the transaction service time. The measured response time is less than the response time objective, therefore this RTP will probably accept more transaction traffic. Call Center OE Application Colorado DBRep-PC Section Name: Montana LAN Server LAN Server LAN LAN Section Type: Client Server LAN Network | LAN Network | Server Network Measurement Type: Calculation Sniffer Server-Monitor Throughput Throughput Delay Response Time 1.53 0.6 1.2 0.25 0.11.6Estimate: Section Utilization 45 % 50 % 50 % 65 % 40 % n/a % Estimate: Section Utilization by 0.22 % 5% 6.66% 0.83 % 0.42 % n/a % Transaction Estimate:

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Predicting Future Response Times

- Use the initial response time as the service time
 - builds from the "best case" view of the transactions
 - valid because it is from very low activity time
- Use the relative priority to control the impact of other work on transactions in the RTP section
 only approximates the relationship
- Use accepted queuing theory techniques
 - approximates response time (problem with high utilizations)
 - see Menascé and Allen books
 - allow override with better results (monitors, models, etc....)

Help

Search Netscape

My.

4

Print

 Application growth:

- Overall growth
- Section growth
- Relationship to other work in the section
 - High
 - Normal

• Low

What is the projected change in the nur	mber of Create Account transactions?
---	--------------------------------------

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(This is the percentage of the existing number of transactions to use in all RTP sections. A value of 100 maintains the current number of transactions in each section. A value of 50 means the expected number of transactions for each section is half of the current number. A value of 200 means the expected number of transactions is twice the current number. Any individual section can be overridden by simply entering a new value below. This default will apply to any transaction count not overridden. To change only a single section, use 100 for the default and then override that section with the new transaction count.)

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Security

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Shop

150

Default transaction count change

🔆 RTP Section Forecasts (dynamic page) - Netscape

Home

<u>File Edit View Go Communicator</u>

3

Reload

2

Forward

5

Back

Section Name:	Operator's Workstation	Call Center LAN	OE Application	Colorado LAN	Corp WAN	Montana LAN	DB Server
Section Type:	Client	LAN Network	Server	LAN Network	WAN Network	LAN Network	Server
Measurement Type:	Calculation	Sniffer	Server-Monitor	Throughput	Calculation	Throughput	Delay
No Load Response Time Estimate:	1.53	0.6	1.2	0.25	0	0.25	1.6
Section Utilization Estimate:	50 %	45 %	65 %	40 %	12 %	20 %	n/a%
Section Utilization by Transaction Estimate:	0.22 %	5%	6.66 %	0.83 %	0%	0.42 %	n/a%
Current Load Response Time Estimate:	1.53	0.63	1.29	0.25	0	0.25	1.6

RTP Sections Information:

Section 1: Calculation inputs for Operator's Workstation of type Client	Count of transactions: 150 Relative transaction priority: Normal 💌	3
Section 2: Sniffer inputs for Call Center LAN of type LAN Network	Count of transactions: 300 Relative transaction priority: Normal 💌	3
Document: Done		P 🖬 🤘

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Help

Search Netscape

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Print

- Application growth:
 - Overall growth
 - Section growth
- Relationship to other work in the section
 - High
 - Normal

• Low

What is the projected change in the number of Create Account transactions?

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(This is the percentage of the existing number of transactions to use in all RTP sections. A value of 100 maintains the current number of transactions in each section. A value of 50 means the expected number of transactions for each section is half of the current number. A value of 200 means the expected number of transactions is twice the current number. Any individual section can be overridden by simply entering a new value below. This default will apply to any transaction count not overridden. To change only a single section, use 100 for the default and then override that section with the new transaction count.)

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Security

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Shop

Default transaction count change

🔆 RTP Section Forecasts (dynamic page) - Netscape

Home

<u>File Edit View Go Communicator</u>

4

Reload

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Forward

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Back

Percent change for all sections (%): 150

3

N

Section Name:	Operator's Workstation	Call Center LAN	OE Application	Colorado LAN	Corp WAN	Montana LAN	DB Serv
Section Type:	Client	LAN Network	Server	LAN Network	WAN Network	LAN Network	Server
Measurement Type:	Calculation	Sniffer	Server-Monitor	Throughput	Calculation	Throughput	Delay
No Load Response Time Estimate:	1.53	0.6	1.2	0.25	0	0.25	1.
Section Utilization Estimate:	50 %	45 %	65 %	40 %	12 %	20 %	n/a %
Section Orilization by Transaction Estimate:	0.22 %	5%	6.66 %	0.83 %	0%	0.42 %	n/a%
Current Load Response Time Estimate:	1.53	0.63	1.29	0.25	0	0.25	1.
Tune Estimate.							
RTP Sections Inform Section 1: Calculation inputs for Operator's Workstation of				Count of tra Renative transaction			3
RTP Sections Inform Section 1: Calculation inputs for	type Client				nsactions: Norm	nal 🔽	2

Help

Search Netscape

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1.53

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Print

Application growth:

- Overall growth
- Section growth

 Relationship to other work in the section

- High
- Normal

LOW

What is the projected change in the number of Create Account transactions?

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(This is the percentage of the existing number of transactions to use in all RTP sections. A value of 100 maintains the current number of transactions in each section. A value of 50 means the expected number of transactions for each section is half of the current number. A value of 200 means the expected number of transactions is twice the current number. Any individual section can be overridden by simply entering a new value below. This default will apply to any transaction count not overridden. To change only a single section, use 100 for the default and then override that section with the new transaction count.)

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Security

Default transaction count change

🔆 RTP Section Forecasts (dynamic page) - Netscape

Home

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7

Reload

Time Estimate:

Transaction Estimate: Current Load Response

2

Forward

5

Back

Percent change for all sections (%): 150

0

0.25

1.6

2

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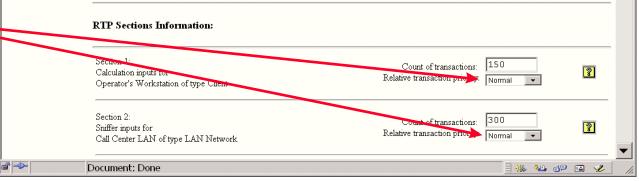
Derault transaction count c.	Percent change for all sections (%):						
Section Name:	Operator's Workstation	Call Center LAN	OE Application	Colorado LAN	Corp WAN	Montana LAN	DB Server
Section Type:	Client	LAN Network	Server	LAN Network	WAN Network	LAN Network	Server
Measurement Type:	Calculation	Sniffer	Server-Monitor	Throughput	Calculation	Throughput	Delay
No Load Response Time Estimate:	1.53	0.6	1.2	0.25	0	0.25	1.6
Section Utilization Estimate:	50 %	45 %	65 %	40 %	12 %	20 %	n/a %
Section Utilization by	0.22 %	5%	6.66%	0.83 %	0%	0.42 %	n/a %

1.29

0.25

0

Shop



0.63

Help

Search Netscape

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Print

Predicting the transaction:

- Objective-
- Actual
- Estimate
- Forecast

Predicting each section

- Response
- Utilization
- Transaction utilization

Response Times for transaction Create Account: Objective for Overall End-to-end Response Time (second)): 6 Actual Measurement of Overall End-to-end Response Time (seconds): 5.5 No Load Overall End-to-end Response Time Estimate (seconds): 5.43 Current Load Overall Response Time Estimate (seconds): 5.55 Forecast Load Overall Response Time Estimate (seconds): 6.67 Projected change in the number of Create Account transactions (%): 150

Go

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Reload

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Section Name:	Operator's Workstation	Call Center LAN	OE Application	Colorado LAN	Corp WAN	Montana LAN	DB Server
Section Type:	Client	LAN Network	Server	LAN Network	WAN Network	LAN Network	Server
Measurement Type:	Calculation	Sniffer	Server-Monitor	Throughput	Calculation	Throughput	Delay
No Load Response Time Estimate:	1.53	0.6	1.2	0.25	0	0.25	1.6
Current Load Response Time Estimate:	1.53	0.63	1.29	0.25	0	0.25	1.6
Forecasted Load Response Time Estimate:	1.66	0.83	1.97	0.32	0	0.29	1.6
Section Utilization Estimate:	50 %	45 %	65 %	40 %	12 %	20 %	n/a %
Section Utilization Forecast:	50.11 %	47.5 %	68.34 %	42.3 %	12 %	22.71 %	11/a %
Section Utilization by Transaction Estimate:	0.22 %	5 %	6.66 %	0.83 %	0 %	0.42 %	n/a %
Section Utilization by Transaction Forecast:	0.33 %	7.5 %	10 %	3.13 %	0 %	3.13 %	n/a %
Document: Done							. 🖬 🎸

6

Shop

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Security

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Search Netscape

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Print

Predicting the transaction:

- Objective
- Actual
- Estimate
- Forecast

Predicting each section

- Response
- Utilization
- Transaction utilization

Response Times for transaction Create Account: Objective for Overall End-to-end Response Time (seconds): 6 Actual Measurement of Overall End-to-end Response Time (seconds): 5.5 No Load Overall End-to-end Response Time Estimate (seconds): 5.43 Current Load Overall Response Time Estimate (seconds): 5.55 Forecast Load Overall Response Time Estimate (seconds): 6.67 Projected change in the number of Create Account transactions (%): 150

Go

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Home

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Section Name:	Operator's Workstation	Call Center LAN	OE Application	Colorado LAN	Corp WAN	Montana LAN	DB Server
Section Type:	Client	LAN Network	Server	LAN Network	WAN Network	LAN Network	Server
Measurement Type:	Calculation	Sniffer	Server-Monitor	Throughput	Calculation	Throughput	Delay
No Load Response Time Estimate:	1.53	0.6	1.2	0.25	0	0.25	1.6
Current Load Response Time Estimate:	1.53	0.63	1.29	0.25	0	0.25	1.6
Forecasted Load Response Time Estimate:	1.66	0.83	1.97	0.32	0	0.29	1.6
Section Utilization Estimate:	50 %	45 %	65 %	40 %	12 %	20 %	n/a %
Section Utilization Forecast:	50.11 %	47.5 %	68.34 %	42.3 %	12 %	22.71 %	n/a %
Section Utilization by Transaction Estimate:	0.22 %	5 %	6.66 %	0.83 %	0 %	0.42 %	n/a %
Section Utilization by Transaction Forecast:	0.33 %	7.5 %	10 %	3.13 %	0 %	3.13 %	n/a %
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Response Times for transaction Create Account: Objective for Overall End-to-end Response Time (seconds): 6 Actual Measurement of Overall End-to-end Response Time (seconds): 5.5 No Load Overall End-to-end Response Time Estimate (seconds): 5.43 Current Load Overall Response Time Estimate (seconds): 5.55 Forecast Load Overall Response Time Estimate (seconds): 6.67 Projected change in the number of Create Account transactions (%): 150

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Section Name:	Operator's	Call Center	OF Application	Colorado	Com WAN	Montana	DB
Section Name:	Workstation	LAN	OE Application	LAN	Corp WAN	LAN	Server
Section Type:	Client	LAN Network	Server	LAN Network	WAN Network	LAN Network	Server
Measurement Type:	Calculation	Sniffer	Server-Monitor	Throughput	Calculation	Throughput	Delay
No Load Response Time Estimate:	1.53	0.6	1.2	0.25	0	0.25	1.6
Current Load Response Time Estimate:	1.53	0.63	1.29	0.25	0	0.25	1.6
Forecasted Load Response Time Estimate:	1.66	0.83	1.97	0.32	0	0.29	1.6
Section Utilization Estimate:	50 %	45 %	65 %	40 %	12 %	20 %	n/a %
Section Utilization Forecast:	50.11 %	47.5 %	68.34 %	42.3 %	12 %	22.71 %	n/a %
Section Utilization by Transaction Estimate:	0.22 %	5 %	6.66 %	0.83 %	0 %	0.42 %	n/a %
Section Utilization by Transaction Forecast:	0.33 %	7.5 %	10 %	3.13 %	0 %	3.13 %	n/a %
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Section Name:	Operator's Workstation	Call Center LAN	OE Application	Colorado LAN	Corp WAN	Montana LAN	DB Server
Section Type:	Client	LAN Network	Server	LAN Network	WAN Network	LAN Network	Server
Measurement Type:	Calculation	Sniffer	Server-Monitor	Throughput	Calculation	Throughput	Delay
No Load Response Time Estimate:	1.53	0.6	1.2	0.25	0	0.25	1.6
Current Load Response Time Estimate:	1.53	0.63	1.29	0.25	0	0.25	1.6
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Section Utilization Estimate:	50 %	45 %	65 %	40 %	12 %	20 %	n/a %
Section Utilization Forecast:	50.11 %	47.5 %	68.34 %	42.3 %	12 %	22.71 %	n/a %
Section Utilization by Transaction Estimate:	0.22 %	5 %	6.66 %	0.83 %	0 %	0.42 %	n/a %
Section Utilization by Transaction Forecast:	0.33 %	7.5 %	10 %	3.13 %	0 %	3.13 %	n/a %
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Operator's Workstation	Call Center LAN	OE Application	Colorado LAN	Corp WAN	Montana LAN	DB Server
Client	LAN Network	Server	LAN Network	WAN Network	LAN Network	Server
Calculation	Sniffer	Server-Monitor	Throughput	Calculation	Throughput	Delay
1.53	0.6	1.2	0.25	0	0.25	1.6
1.53	0.63	1.29	0.25	0	0.25	1.6
1.66	0.83	1.97	0.32	0	0.29	1.6
50 %	45 %	65 %	40 %	12 %	20 %	n/a %
50.11 %	47.5 %	68.34 %	42.3 %	12 %	22.71 %	n/a %
0.22 %	5 %	6.66 %	0.83 %	0 %	0.42 %	n/a %
0.33 %	7.5 %	10 %	3.13 %	0 %	3.13 %	n/a %
	Workstation Client Calculation 1.53 1.53 1.66 50 % 50.11 % 0.22 %	Workstation LAN Client LAN Network Calculation Sniffer 1.53 0.6 1.53 0.63 1.66 0.83 50 % 45 % 0.22 % 5 %	Workstation LAN OE Application Client LAN Network Server Calculation Sniffer Server-Monitor 1.53 0.6 1.2 1.53 0.63 1.29 1.66 0.83 1.97 50 % 45 % 65 % 50.11 % 47.5 % 68.34 % 0.22 % 5 % 6.66 %	Workstation LAN OE Application LAN Client LAN Network Server LAN Network Calculation Sniffer Server-Monitor Throughput 1.53 0.6 1.2 0.25 1.53 0.63 1.29 0.25 1.66 0.83 1.97 0.32 50 % 45 % 65 % 40 % 50.11 % 47.5 % 68.34 % 42.3 % 0.22 % 5 % 6.66 % 0.83 %	Workstation LAN OE Application LAN Corp WAN Client LAN Server LAN WAN Client LAN Server LAN WAN Calculation Sniffer Server-Monitor Throughput Calculation 1.53 0.63 1.2 0.25 0 1.53 0.63 1.29 0.25 0 1.66 0.83 1.97 0.32 0 50 % 45 % 65 % 40 % 12 % 0.22 % 5 % 6.66 % 0.83 % 0 %	WorkstationLANOE ApplicationLANCorp WANLANClientLAN NetworkServerLAN NetworkMAN NetworkLAN NetworkCalculationSnifferServer-MonitorThroughputCalculationThroughput1.530.661.20.2500.251.530.631.290.2500.251.660.831.970.3200.2950 %45 %65 %40 %12 %20 %50.11 %47.5 %68.34 %42.3 %12 %22.71 %0.22 %5 %6.66 %0.83 %0 %0.42 %

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Section Name:	Operator's Workstation	Call Center LAN	OE Application	Colorado LAN	Corp WAN	Montana LAN	DB Server
Section Type:	Client	LAN Network	Server	LAN Network	WAN Network	LAN Network	Server
Measurement Type:	Calculation	Sniffer	Server-Monitor	Throughput	Calculation	Throughput	Delay
No Load Response Time Estimate:	1.53	0.6	1.2	0.25	0	0.25	1.6
Current Load Response Time Estimate:	1.53	0.63	1.29	0.25	0	0.25	1.6
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Section Utilization by Transaction Estimate:	0.22 %	5 %	6.66 %	0.83 %	0 %	0.42 %	n/a %
Section Utilization by Transaction Forecast:	0.33 %	7.5 %	10 %	3.13 %	0 %	3.13 %	n/a %
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Response Times for transaction Create Account: Objective for Overall End-to-end Response Time (seconds): 6 Actual Measurement of Overall End-to-end Response Time (seconds): 5.5 No Load Overall End-to-end Response Time Estimate (seconds): 5.43 Current Load Overall Response Time Estimate (seconds): 5.55 Forecast Load Overall Response Time Estimate (seconds): 6.67 Projected change in the number of Create Account transactions (%): 150

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Workstation	LAN	OE Application	Colorado LAN	Corp WAN	Montana LAN	DB Server
Client	LAN Network	Server	LAN Network	WAN Network	LAN Network	Server
Calculation	Sniffer	Server-Monitor	Throughput	Calculation	Throughput	Delay
1.53	0.6	1.2	0.25	0	0.25	1.6
1.53	0.63	1.29	0.25	0	0.25	1.6
1.66	0.83	1.97	0.32	0	0.29	1.6
50 %	45 %	65 %	40 %	12 %	20 %	n/a %
50.11 %	47.5 %	68.34 %	42.3 %	12 %	22.71 %	n/a %
0.22 %	5 %	6.66 %	0.83 %	0 %	0.42 %	n/a %
0.33 %	7.5 %	10 %	3.13 %	0 %	3.13 %	n/a %
	Calculation 1.53 1.53 1.66 50 % 50.11 % 0.22 %	Chent Network Calculation Sniffer 1.53 0.6 1.53 0.63 1.66 0.83 50 % 45 % 50.11 % 47.5 % 0.22 % 5 %	Chent Network Server Calculation Sniffer Server-Monitor 1.53 0.6 1.2 1.53 0.63 1.29 1.66 0.83 1.97 50 % 45 % 65 % 50.11 % 47.5 % 68.34 % 0.22 % 5 % 6.66 %	Chent Network Server Network Calculation Sniffer Server-Monitor Throughput 1.53 0.6 1.2 0.25 1.53 0.63 1.29 0.25 1.66 0.83 1.97 0.32 50 % 45 % 65 % 40 % 50.11 % 47.5 % 68.34 % 42.3 % 0.22 % 5 % 6.66 % 0.83 %	Chent Network Server Network Network Calculation Sniffer Server-Monitor Throughput Calculation 1.53 0.66 1.2 0.25 0 1.53 0.63 1.29 0.25 0 1.66 0.83 1.97 0.32 0 50 % 45 % 65 % 40 % 12 % 50.11 % 47.5 % 68.34 % 42.3 % 0 % 0.22 % 5 % 6.66 % 0.83 % 0 %	Chent Network Server Network Network Network Network Calculation Sniffer Server-Monitor Throughput Calculation Throughput 1.53 0.66 1.2 0.25 0.0 0.25 1.53 0.63 1.29 0.25 0 0.25 1.66 0.83 1.97 0.32 0 0.29 50 % 45 % 65 % 40 % 12 % 20 % 50.11 % 47.5 % 68.34 % 42.3 % 12 % 22.71 % 0.22 % 5 % 6.66 % 0.83 % 0 % 0.42 %

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