Don’t Predict Applications When You Should Model the Business

CMG98 Session 6201

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Agenda

- **What is Enterprise Modeling?**
  - Levels: Device to Business
  - Objectives
- **Simalytic Modeling Review**
- **Business Modeling**
  - Simalytic Implementation
- **Business Model Example**
  - Advantages of a Simalytic approach
- **Conclusion**

Enterprise Modeling?

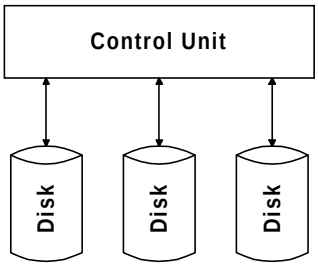
- **System View**
  - Is the system big and fast enough?
  - Where are the bottlenecks?
- **Application View**
  - Which computer systems does it use?
  - Does the response time meet the objective?
- **Business View**
  - Business impact of application performance?
  - What is the Return on Investment for changes?

Overall Objectives

- **Understand Application Performance**
  - Across all aspects of the Enterprise
  - Interrelationships between components
- **Define Levels of Detail**
  - Device → System → Environment → Business
- **Connect the Levels**
  - Use lower level results in general model
  - Use general model to find critical areas
  - Use highest level to analyze business impact

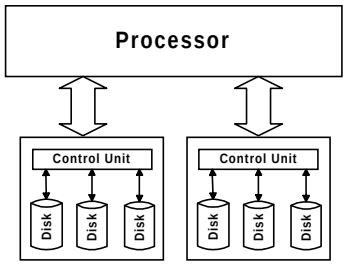
Disk Subsystem Model

- **Device Performance Analysis**
  - Focus on configuration details
  - Large amounts of trace data
  - Straight-forward verification
  - Good understanding of data paths
  - Relationship to application???
  - Relationship to business??????



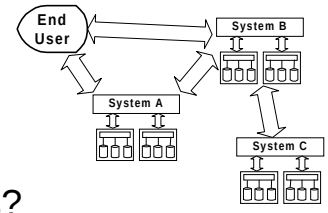
Single System Model

- **Capacity/Performance Analysis**
  - Focus closer to acquisition level
  - Still large amounts of trace data
  - Verification ease is OS dependent
  - General understanding of data paths
  - Relationship to application?
  - Relationship to business???



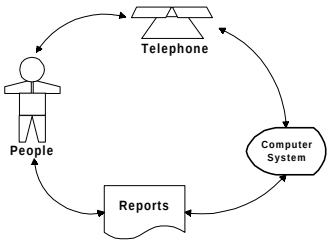
Application Model

- **Transaction Flow**
  - Focus closer to user's expectations
  - Little overall trace data
  - Verification is hard to impossible
  - Poor understanding of data paths
  - Good relationship to application
  - Relationship to business?



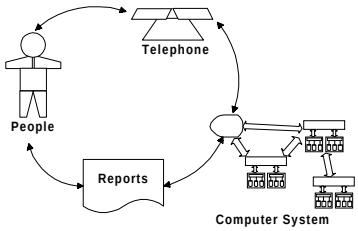
Business Model

- **Process Flow**
  - Focus on ROI (Return On Investment)
  - Little use of overall trace data
  - Verification is complex
  - Understanding of data paths poor to good
  - Good relationship to business
  - Poor relationship to application computer systems



Combined Model

- **Transaction and Process Flow**
  - Focus on supporting the business
  - Better use of trace data
  - Verification no more complex
  - Variable understanding of data paths
  - Good relationship to business
  - Good relationship to application computer systems



Simalytic Modeling Review

- **"Simalytic" (Simulation/Analytic)**
  - Hybrid - Combination of Techniques
    - Simulation model as framework
    - Analytic queuing theory node models
    - Simalytic Function bridges techniques
  - Existing tools
  - Predict capacity requirements
  - Heterogeneous computer systems
  - Enterprise level application model

Modeling Tools

- **Platform-Centric Tools**
  - Narrow focus - Tend to be Analytic based
    - Detailed information about single platform
    - Easier to build but limited environments
- **General Purpose Tools**
  - Broad focus - Tend to be Simulation based
    - Features to model anything
    - Level of granularity = Level of effort
- **Business Process Tools**
  - Simulation of Business over Time
    - Flows and levels
- **All Available as Commercial Tools**

Applicable Tools

- **Most Applicable Modeling Tool**
  - Can be different for each node or part of a model
  - Improves construction speed and accuracy
- **Application Components**
  - Initially assumed constant
  - Modeled for greater detail
  - Specialized modeling tool for critical sections

Business Modeling

- **What is it?**
  - “System Dynamics” - Began in the 1950’s
  - Tool for managers to analyze complex issues
- **How is it done?**
  - Study:
    - the parts of a system
    - the interactions between the parts
- **Why do it?**
  - Maintain focus on business strategic objectives

What’s the Difference?

- **Planning Capacity**
  - System view - Internal task measurement
  - Resource utilization
- **Predicting Applications**
  - Enterprise view - User task measurement
  - Application responsiveness
- **Modeling the Business**
  - Business view - Return on Investment
  - Process flow understanding

Simalytic Modeling

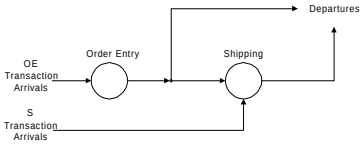
- **Simalytic Modeling Phases**
  - Workload Analysis
  - Node Models
  - Simulation Model
  - Simalytic Model
  - Model Analysis
- **Simalytic Business Modeling Phases**
  - Business Process Analysis
  - Business Model Construction
  - Simalytic Function Integration
  - Business Model Analysis

Example
Application

- **Order Entry Call Center**
  - Operators service customers
  - Two servers support Operators
    - Order Entry server - workload of interest
    - Shipping server - also used by OE transactions
- **Objective of the Business Model**
  - Understand the impact of transaction responsiveness on the business
  - Determine the minimal number of operators required for each hour

Example
Transaction Analysis

- **Simple Two Server Model**
  - Some OE transactions routed to both the Order Entry and the Shipping servers
  - Transaction response time goals:
    - OE = 1.7 seconds
    - S = 10 seconds
  - Same example presented in CMG97 paper



Example
Responsiveness

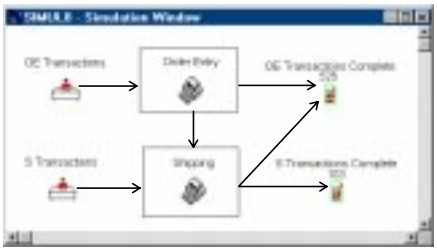
- **Transaction RT**
  - Table of RT results profiles application at each server
  - Created using OpenQN analytic modeling tool
  - Not every arrival rate required

Arrival Rates	Response Times: Order Entry	Response Times: Shipping
0.01	0.10	2.01
0.50		2.70
1.00	0.10	4.54
1.10		5.43
1.20		6.98
1.25		8.33
1.30		10.65
1.35		15.76
1.40		38.21
1.42		119.96
2.00	0.11	
10.00	0.20	
15.00	0.66	
15.75	1.15	
16.00	1.56	
16.25	2.46	
16.50	6.06	

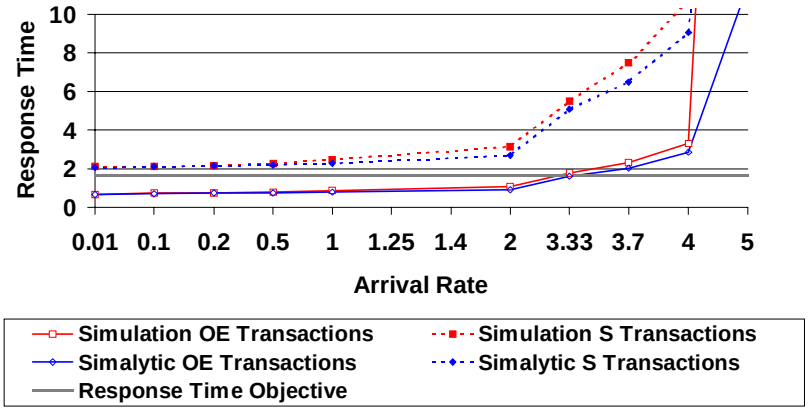
OpenQN Example Results

Example
Simalytic Model

- **Application Model**
  - Framework simulation model in Simul8
  - Replace static service times with Simalytic Function using OpenQN model results
  - Simalytic Model run for expected transaction arrival rates



Example
Transaction Results



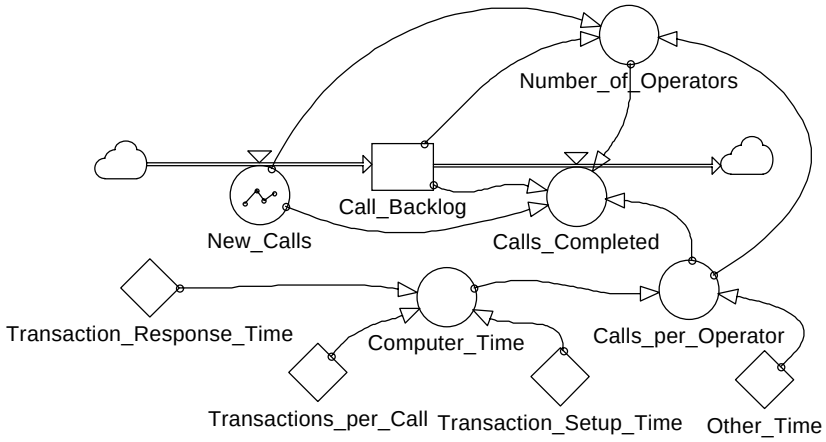
Example
Business Analysis

- **Business Elements**
  - Call Flow
  - Call Completion Time
    - Computer time (includes transaction response time)
    - Other time (simplified process for this example)
  - Call Backlog
  - Operator Productivity

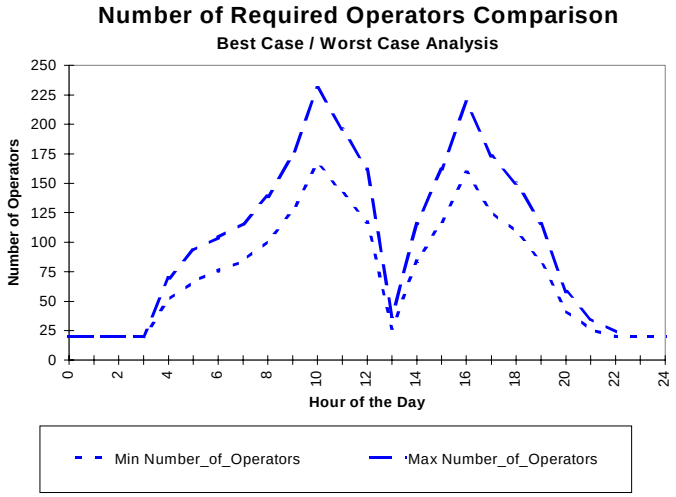
Example
Business Analysis

- **Relationship Between Elements**
  - Degree (i.e. small change causes large change)
  - Direction (direct, inverse, not consistent, etc.)
- **Other Aspects: (Not Addressed in Example)**
  - Calls: Types, length, complexity
  - Operators: Training, experience, seniority
  - Orders: Number per call, size, special kinds
  - Inventory: Age, promotions, turn-over

Example
Business Model



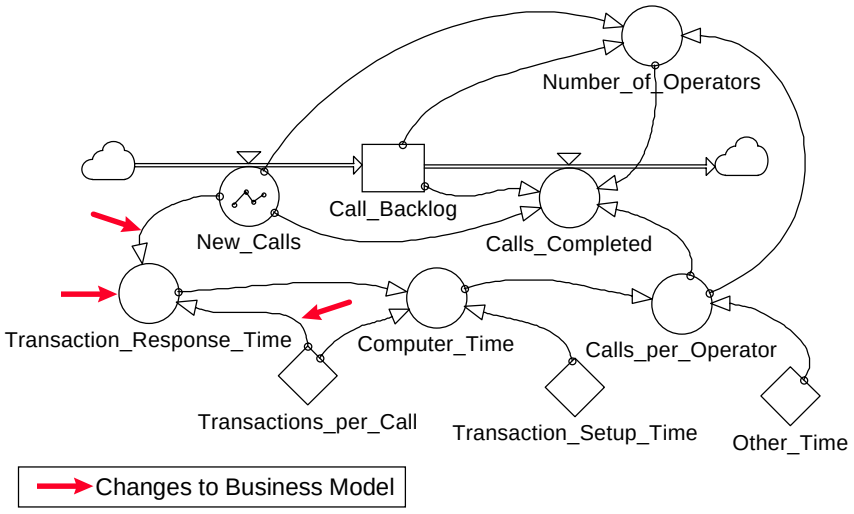
Example
Business Model Results



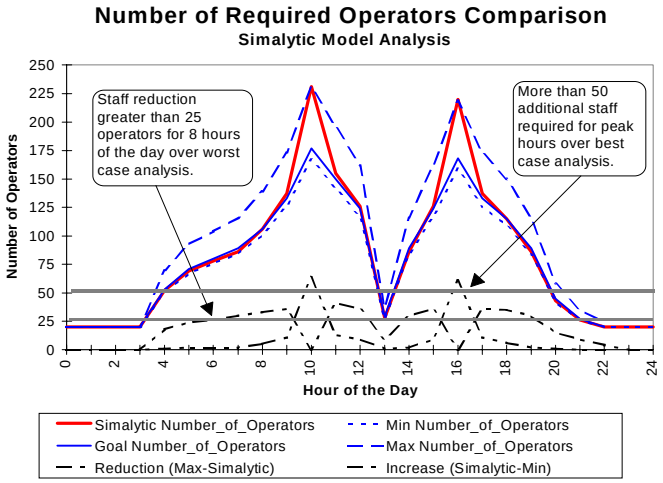
Example
Simalytic Business Analysis

- **Same Business Model**
- **Vary Transaction Response Time**
  - Business load adjusts transaction load
  - Transaction load determines response time
  - Response time impacts backlog
  - Backlog determines number of operators
- **Key: Transaction response time is based on a realistic application profile created by a valid application model.**

Example
Simalytic Business Model



Example
Business Model Results



Example
Business Model Analysis

- **Number of Operators Required**
  - Best case model shows non-stress number
  - Worst case model shows peak number
  - Simalytic model shows which applies to each hour
- **Best / Worst case scenarios identify the extremes but not the transition between them.**
- **Simalytic approach directly correlates upgrade cost to expense reduction.**

Conclusion

- **Capacity Planning is Evolving**
  - From system to applications focus
  - Greater need to predict application performance
  - Increased desire to relate application performance to business requirements
  - Evolution increases complexity
    - Client/Server increasing application complexity
    - Requires increasing modeling complexity
    - Adding complexity adds time, effort and cost
    - Business impact is the ultimate measure

Conclusion

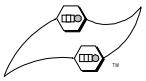
- **Most Modeling Tools**
  - Good for specific problems
    - But generally only for a subset of whole problem
  - Fail when extended beyond design scope
    - Cannot be everything for everyone
- **Needed Approach**
  - Connect the “islands”
  - Examine the whole problem
  - Focus on details when needed

Conclusion

- **Modeling Applications across Enterprise**
  - Focus on evolution of capacity planning
  - Predicts application performance
  - Answer the business questions
- **Simalytic Business Modeling**
  - Technique for modeling applications
    - Across the enterprise with a business perspective
    - Defined implementation steps
    - Addresses the increased complexity

Conclusion

- **Don’t Plan Capacity**
  - Of complex multi-server applications
  - Or multi-tier Client/Server systems
- **Don’t Predict Applications**
  - Without overall objectives
  - Or understanding the business process impact
- **Model the Business**
  - To answer the Business questions
  - And insure the Business succeeds



Questions

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