PERFORMANCE TESTING AND MODELING FOR NEW ANALYTIC APPLICATIONS

Boris Zibitsker and Alex Podelko

ABOUT THE SPEAKERS

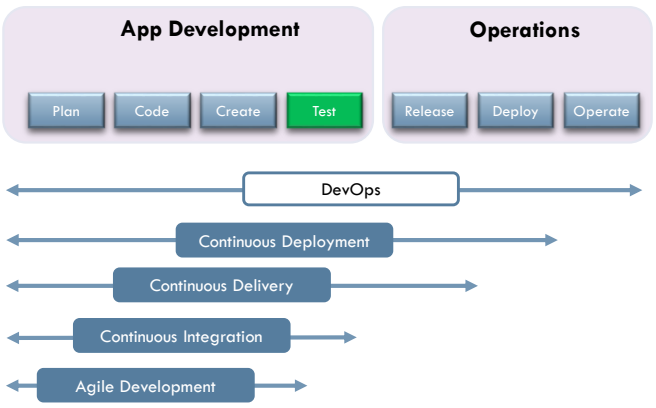
- Boris Zibitsker
- CEO BEZNext
- Manage development of Performance Assurance software for Data Warehouse and Big Data applications for On Prem and Cloud environments

- Alexander Podelko
- Specializing in performance since 1997
- Currently Consulting Member of Technical Staff at Oracle (Stamford, CT)
- Performance testing and optimization of Enterprise Performance Management (EPM) a.k.a. Hyperion products
- Board director at Computer Measurement Group (CMG) – non-profit organization of performance and capacity professionals

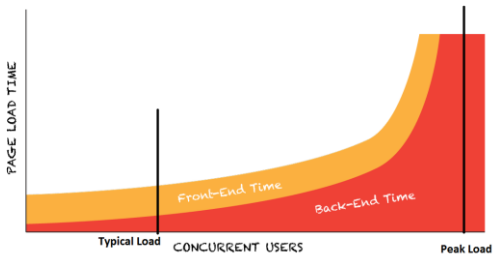
OUTLINE

- Introduction and Problem Description
- Value and limitations of the performance testing
- How modeling and optimization add value to Performance Testing
- Summary - Testing and modeling reduce risk of performance surprises

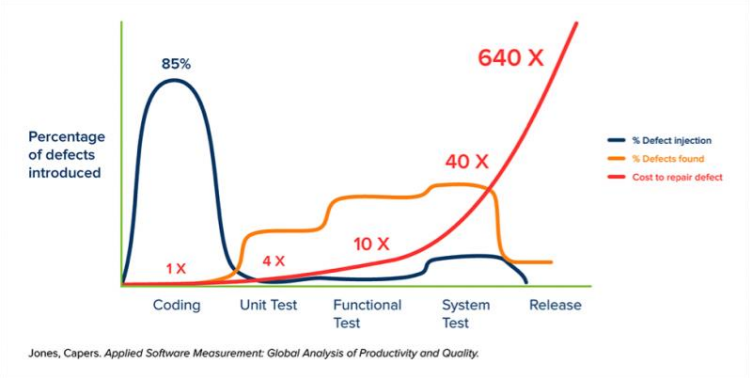
DEVOPS FOR NEW SYSTEMS
TRADITIONAL LOAD/PERFORMANCE TESTING



- Focus: Can the System Handle Peak Load?

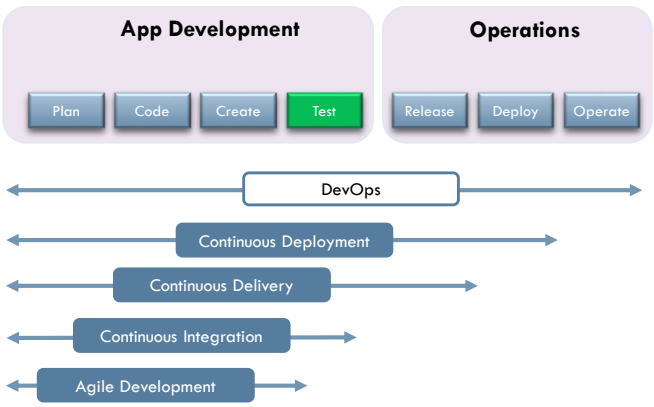


COST OF FIXING DEFECTS DURING EARLIER PHASES OF APPLICATION LIFE CYCLE IS SIGNIFICANTLY LOWER



DEVOPS FOR NEW SYSTEMS

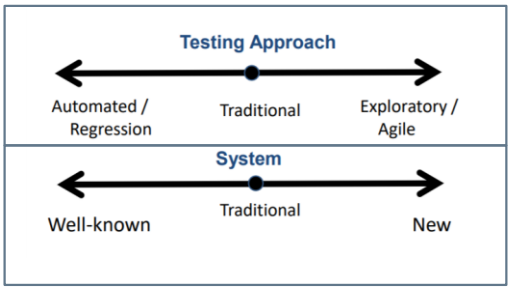
TODAY'S PERFORMANCE TESTING



- All the time
  - Early performance testing
  - Continuous performance testing
- Different scope
  - Full-scale testing not always feasible
  - Component / subsystem / small-scale / etc.

CONTINUUM OF OPTIONS

Testing Approach



Scenarios

- System validation for high load
  - Outside load (service or cloud), production system
  - Wider scope, lower repeatability
- Performance optimization / troubleshooting
  - Isolated lab environment
  - Limited scope, high repeatability
- Testing in Cloud
  - Lowering costs (in case of periodic tests)
  - Limited scope, low repeatability

8

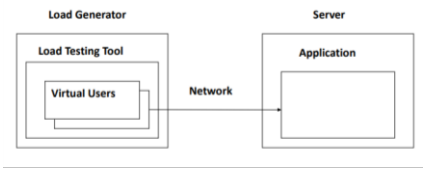
ENVIRONMENT / SCOPE

- **Environment**
  - Lab On Prem
  - Cloud
    - No more excuse of not having hardware
  - Lab vs. Service (SaaS) vs. Cloud (IaaS)
    - For both the system and load generators

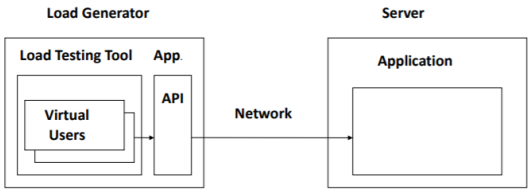
- **Scope**
  - Test vs. Production
  - Unit
  - Component
  - Service (Microservice)
  - Sub System (Several Components)
  - System

LOAD GENERATION

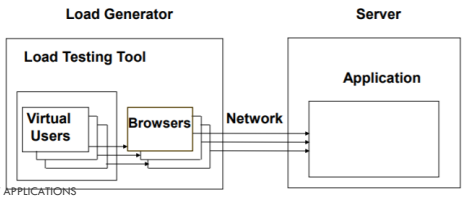
Record and Playback: Protocol Level



Programming



Record and Playback: UI Level



MOST POPULAR LOAD TESTING TOOLS

Commercial

- Microfocus LoadRunner family
- Microfocus Silk Performer
- Neotys NeoLoad
- IBM Rational Performance Tester
- RadView WebLoad
- SmartBear LoadNinja

Commercial on the top of Open Source

- Broadcom/CA BlazeMeter
- Tricentis Flood.io
- RedLine13
- Octoperf

Open Source

- Apache JMeter
- Gatling
- k6
- Locust

TESTING STRATEGY BECAME VERY NON-TRIVIAL

Challenges

- A lot of options along many dimensions
- Defined by context
- "Automation" is only one part of it
  - Important for iterative development
- Part of performance engineering strategy
  - Should be considered amongst other activities

Sample of Questions to be answered to define Testing Strategy

- What are performance risks we want to mitigate?
  - What part of this risks should be mitigated by performance testing?
- Which performance tests will mitigate the risk?
- When we should run them?
- What process/environment/approach/tools we need in our context to implement them?

VALUE AND LIMITS OF TODAY'S PERFORMANCE TESTING

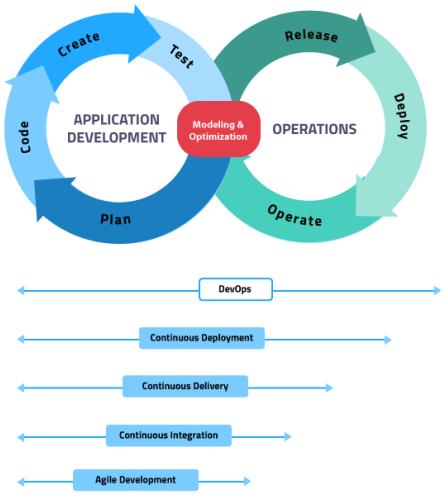
Value

- Pro-active way to mitigate performance risk
- Early problem detections prevents costly redesigns and delays
- Flexibility – strategy may be optimized for specific context
- Constant stream of performance-related information

Limits

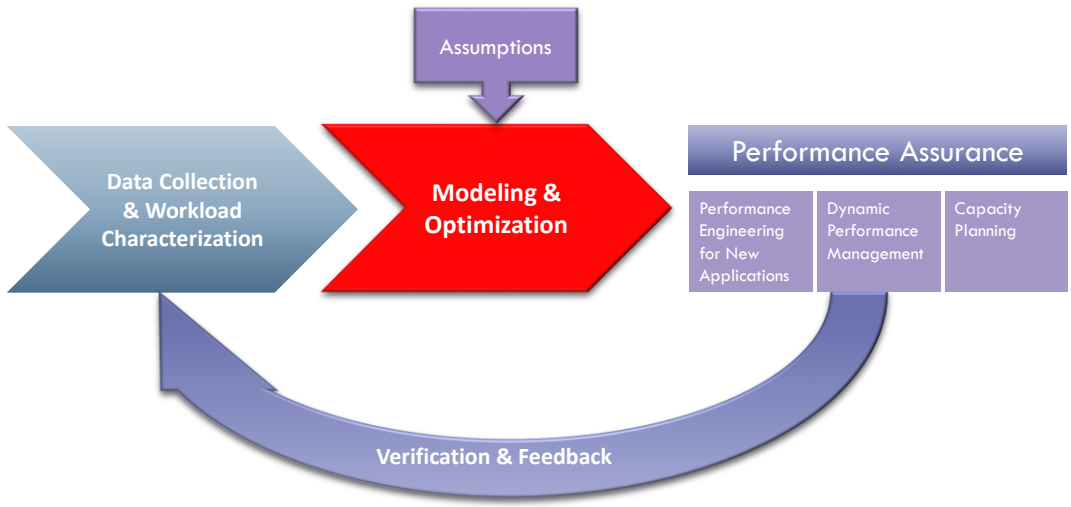
- Expensive on a high-scale level
- Partial info, lack of a holistic view
- Role of modeling –
  - complement Performance Testing by creating a big picture view
  - answering many what if questions
  - Evaluating options
  - Development proactive recommendations

ROLE OF MODELING DURING DEVOPS PROCESS



- **Recommendations for Application Developers**
  - Identify Anomalies and their Root Causes after each build during testing of new applications
  - Predict how new application will perform in production environment
  - Develop code modification and performance tuning recommendations to Application Developers
- **Recommendations for Operations**
  - Predict how deployment of new applications will affect Response Time and Throughput of existing applications
  - Develop workload management and capacity planning recommendations
  - Set up realistic expectations
  - Enable results verification

MODELING IS A BASE FOR PERFORMANCE ASSURANCE DURING DEVOPS

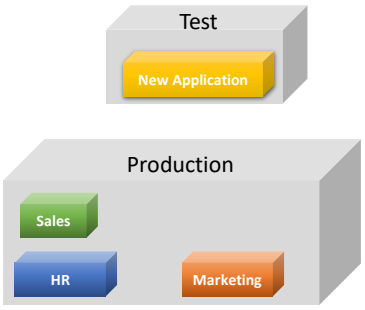


TEN STEPS OF APPLYING MODELING TO OPTIMIZE APPLICATION DEVELOPMENT AND OPERATIONAL DEVOPS DECISIONS

FIRST STEP

DATA COLLECTION DURING PERFORMANCE TESTING AND FOR PRODUCTION WORKLOADS

Data Collection during Performance Testing of New Application on Test System and for all workloads in Production Environments

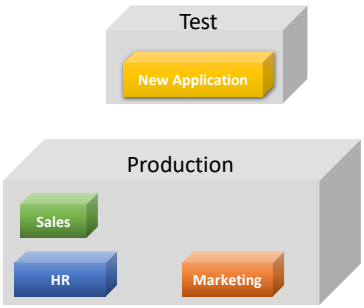


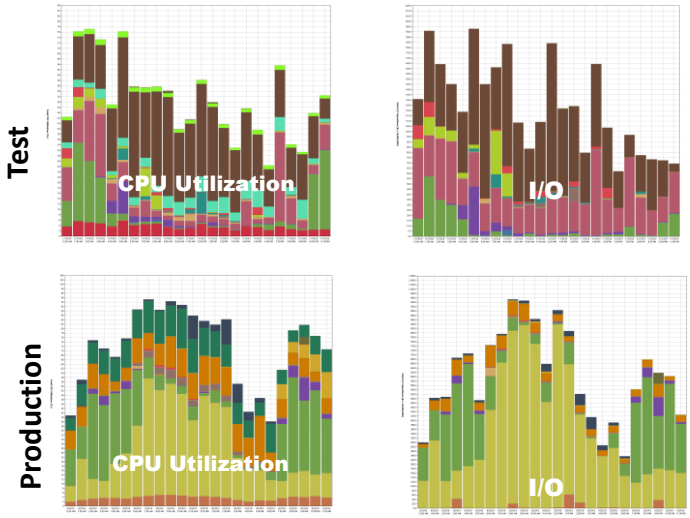
Measurement Data Types

- Hardware and Software Configuration
- Response Time
- Throughput
- CPU Utilization and CPU Service Time per request
- Disk Utilization, I/O rate , #I/O operations per request and KB/Request, Channel Utilization
- Memory utilization
- Network utilization
- Level of concurrency

SECOND STEP
WORKLOAD CHARACTERIZATION

Test and Production Environments



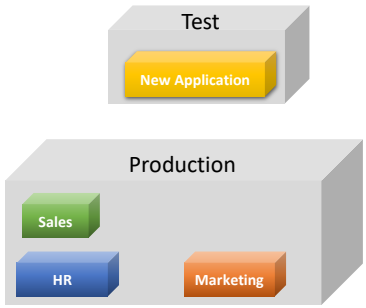


THIRD STEP
ANOMALY AND ROOT CAUSE DETECTION

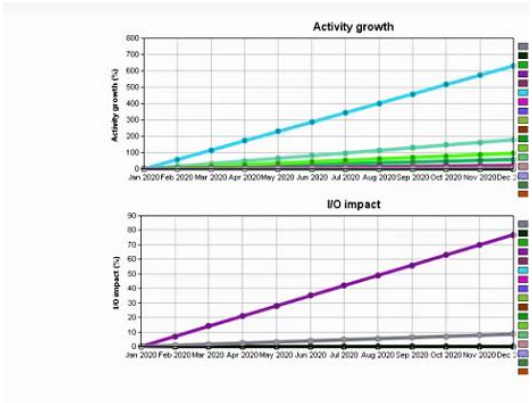
FOURTH STEP

WORKLOAD FORECASTING FOR NEW AND PRODUCTION WORKLOADS

Test and Production Environment

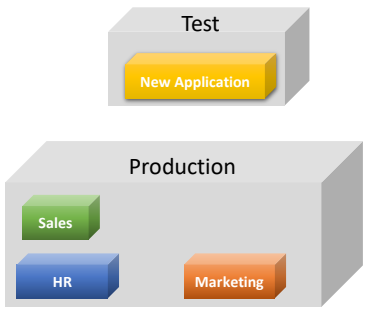


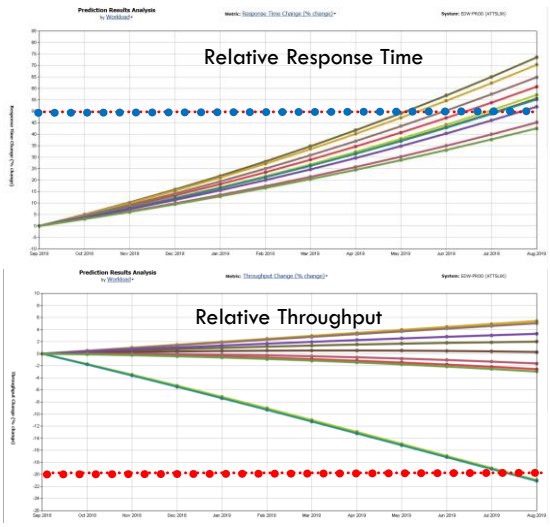
Expected Workload and Volume of Data Growth



FIFTH STEP

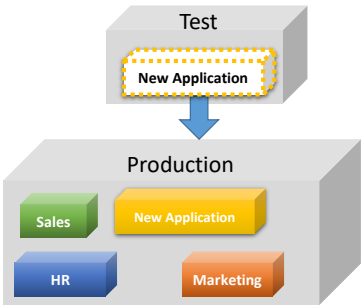
PREDICTING IMPACT OF EXPECTED WORKLOAD AND VOLUME OF DATA GROWTH IN PRODUCTION ENVIRONMENT

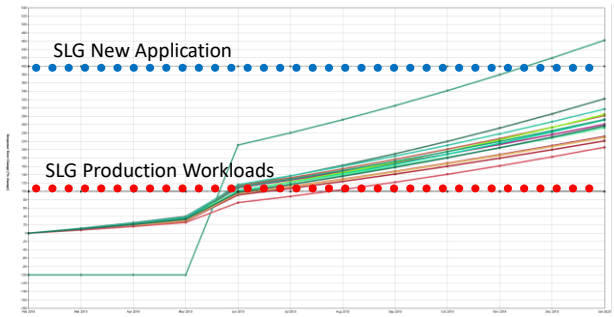




SIX STEP

PREDICTING IMPACT OF NEW APPLICATION IMPLEMENTATION

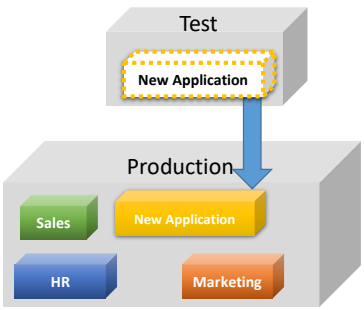




SEVENTH STEP

PREDICTING IMPACT OF THE WORKLOAD MANAGEMENT OPTIMIZATION

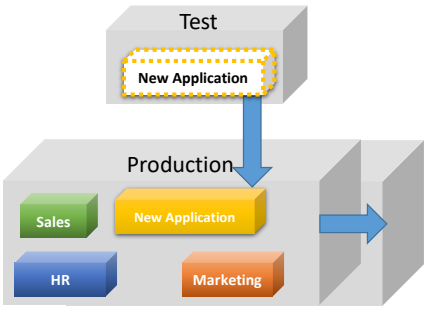
WORKLOAD MANAGEMENT OPTIMIZATION WILL NOT BE SUFFICIENT TO MEET SLG

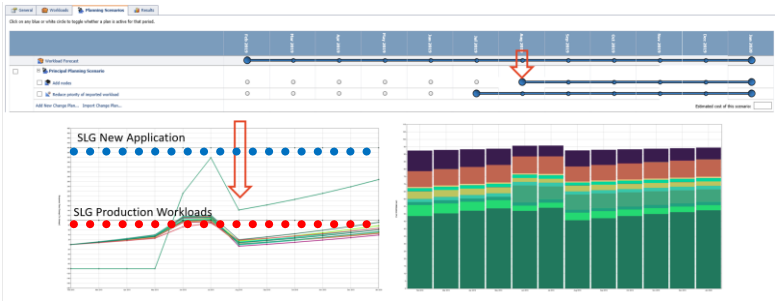


EIGHTH STEP

PREDICTING MINIMUM ON PREM UPGRADE REQUIRED TO MEET SLG AFTER NEW APPLICATION IMPLEMENTATION

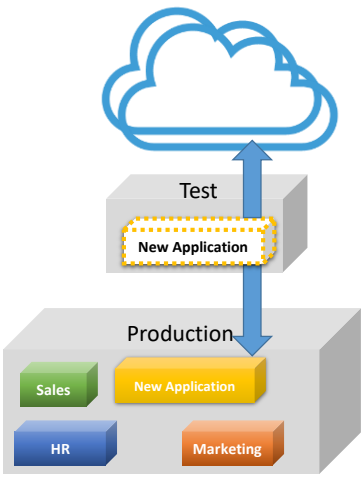
ADDITIONAL 14 NODES WILL BE REQUIRED TO MEET SLG





NINTH STEP

DETERMINING APPROPRIATE CLOUD PLATFORM FOR NEW APPLICATION

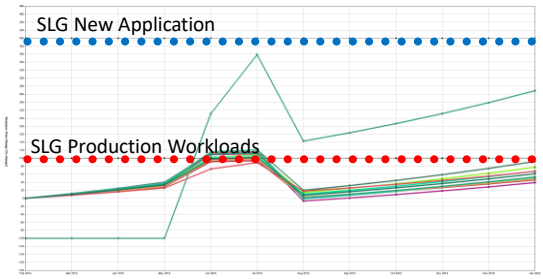


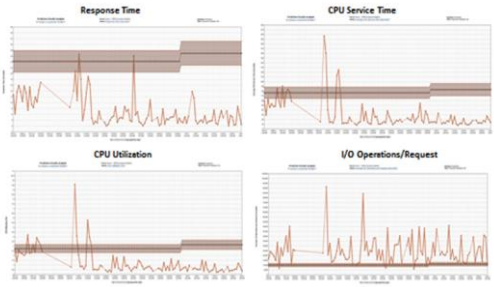
BEZNext Approach to Selection of the Appropriate Cloud

- Predict the minimum configuration required to meet SLGs
  - Instance type and # of instances which will be required Hour by Hour, Shift by Shift, Month by Month to meet SLGs for each of On Prem Production workload on each of the optional Cloud Platform
- Predict cost of running On Prem Data Warehouse Workloads on each of the optional Cloud Platforms
- Select Cloud platform capable to meet SLGs for all of the growing workloads with the lowest cost

TENTH STEP

AUTOMATIC RESULT VERIFICATION AND CREATION OF CONTINUOUS PERFORMANCE ASSURANCE PROCESS





SUMMARY

- Measurement data collected during performance testing are used to identify and fix performance problems for new applications prior to their deployment in production
- Models built based on measurement data collected in test and production environments are used to predict how new applications will perform in production environment and predict how they will affect the performance of the existing production applications
- Modeling and optimization generate proactive performance tuning, workload management and capacity planning recommendations focusing on how to consistently meet SLGs for growing workloads with the lowest cost
- Modeling complements performance testing by addressing variety of what-if questions for Application Developers and Operations to mitigate performance risks and avoid performance surprises

THANK YOU!
QUESTIONS?

bzibitsker@beznext.com
apodelko@yahoo.com