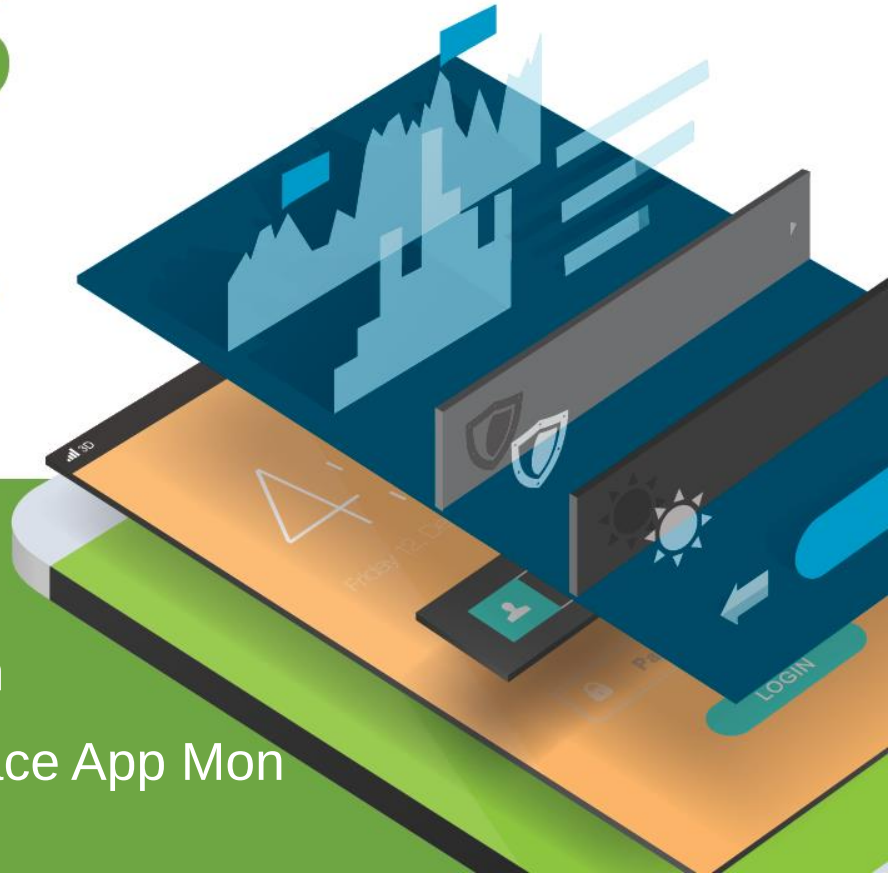
Perform 2015

Build Your Digital Future



Beyond Monitoring

Andreas Brunnert

Peter Zahrer

Performance Prediction

Using RETIT & Dynatrace App Mon

Agenda

Performance Modeling

Use Cases, Benefits and Examples

Demo

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Performance Modeling

Take your continuous delivery to the next level.

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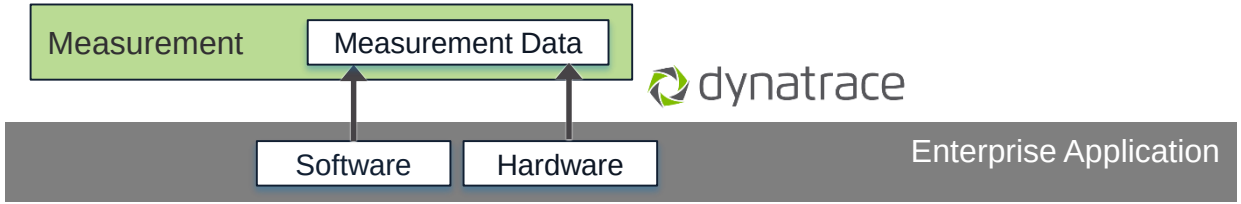
Performance Modeling - Why?

A new version of your application is on the way:

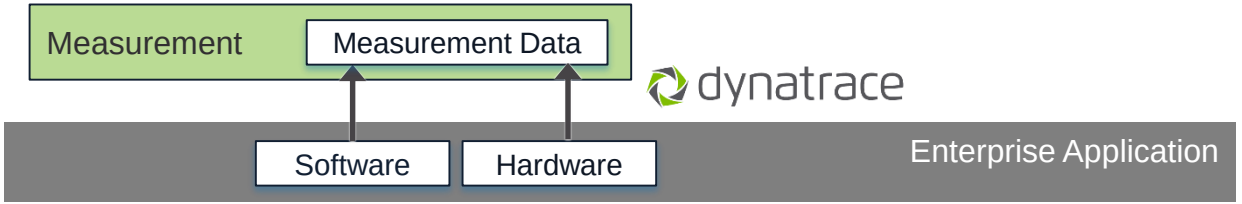
- … review realtime application performance.
- … evaluate realtime performance metrics.
- … deep dive into single components of your environment.



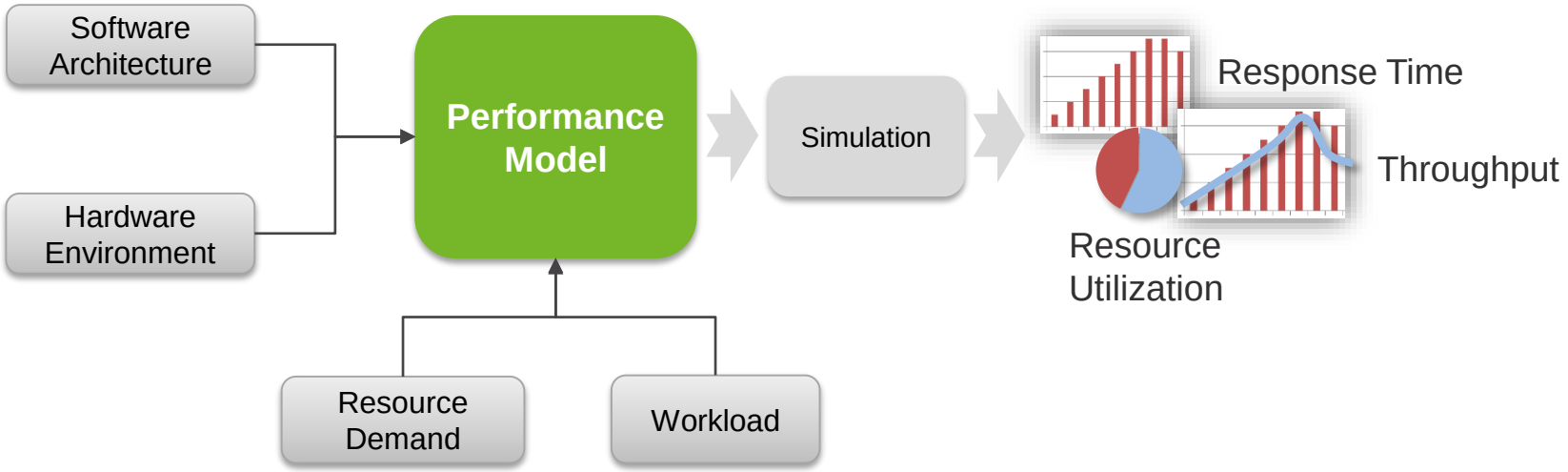
Performance Modeling - Why?

What happens if…

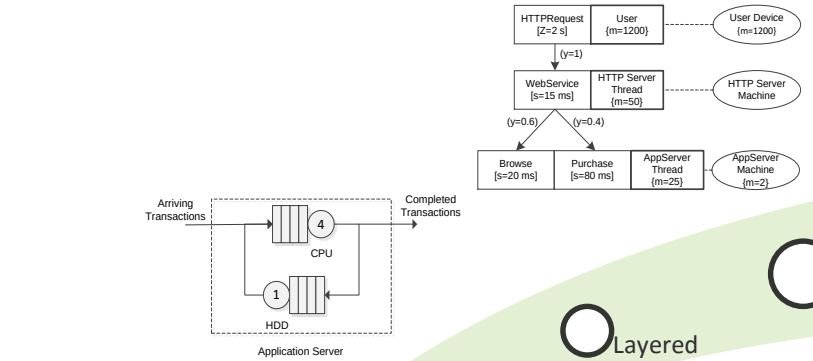
- … you change your deployment topology?
- … you migrate to a different HW environment?
- … the workload changes?
- … you reduce the number of CPU cores?



Performance Modeling - What?



A Brief History of Performance Modeling

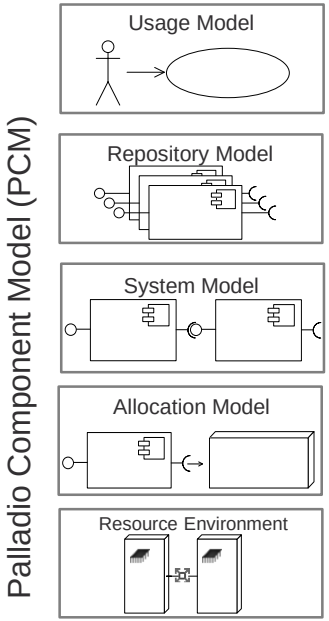


Queuing Theory (Erlang, ~1906)

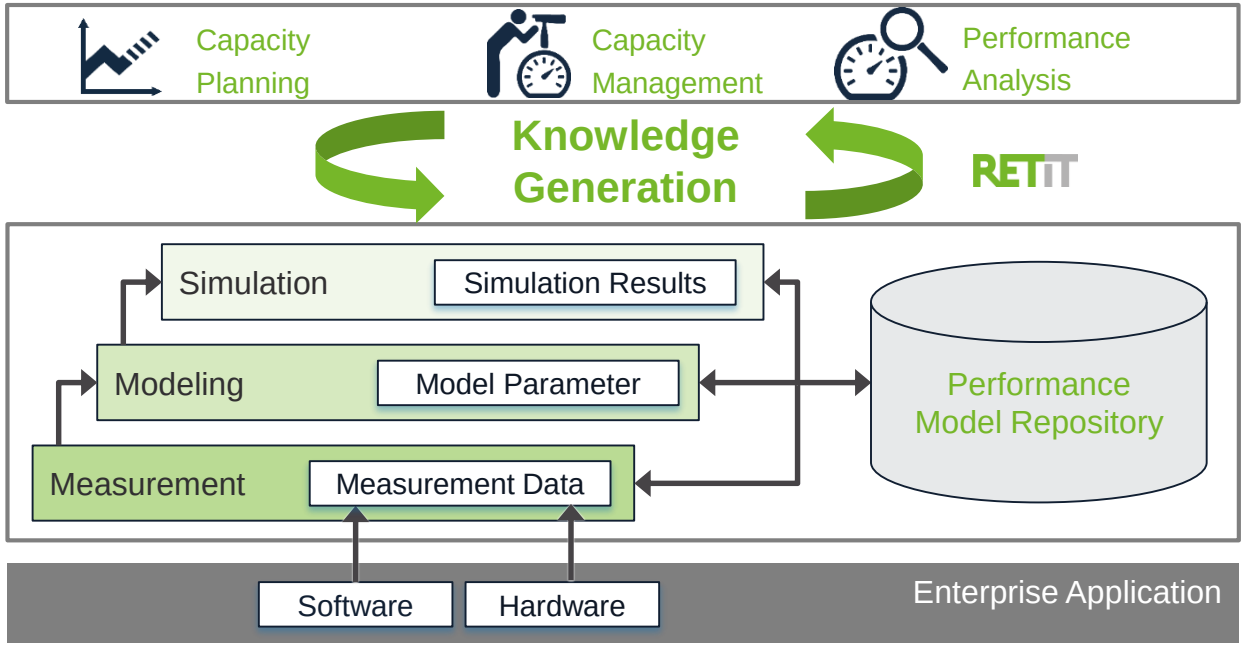
Queuing Networks (Jackson, ~1963)

Layered Queuing Networks (Neilson / Woodside, ~1995)

Architecture-Level Performance Models (Reussner / Becker ~2009)



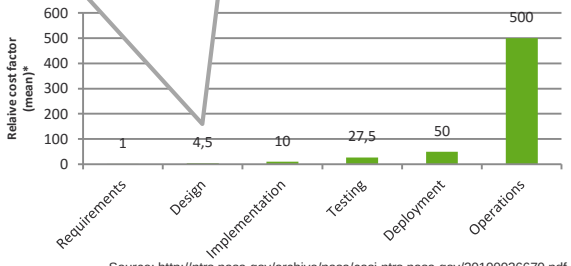
Performance Modeling – How?



Performance Modeling – When?

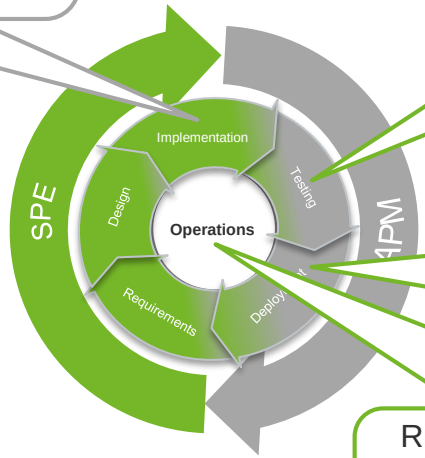
Detect performance change in every version created in a continuous delivery pipeline without the need for expensive performance tests.

Fix performance-related bugs earlier and for less costs by managing performance knowledge using models.



Source: http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20100036670.pdf
*The cost factor for fixing a performance-related problem is normalized in the different phases relative to the cost of fixing a defect in the requirements phase.

Dev Ops



Extrapolate your (load/performance) test results and reduce labor, machinery and license costs by reducing the amount tests.

Provide models along with your application binaries to simplify capacity planning activities.

Right-size your environment for seasonal peaks or to reduce license / operating cost (e.g., reduce the amount of cloud instances).

Dynatrace-Compatible RETIT Solutions

- **RETIT Capacity Manager (RCM)**

- Performance modeling environment
- Connect to any of your Dynatrace deployments to generate performance models
- “ What-If ” scenario simulations:
  - Hardware changes
  - Workload changes
  - Software architectural changes

Dynatrace-Compatible RETIT Solutions

- **RETIT Continuous Delivery (RCD)**

- Plugin for the Jenkins CI server
- Detects performance changes automatically
- Uses Dynatrace data collected in previous test phases (e.g., acceptance tests) to generate models
- Can evaluate performance for multiple hardware environments and workloads

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Performance Modeling

Use Cases, Benefits and Examples

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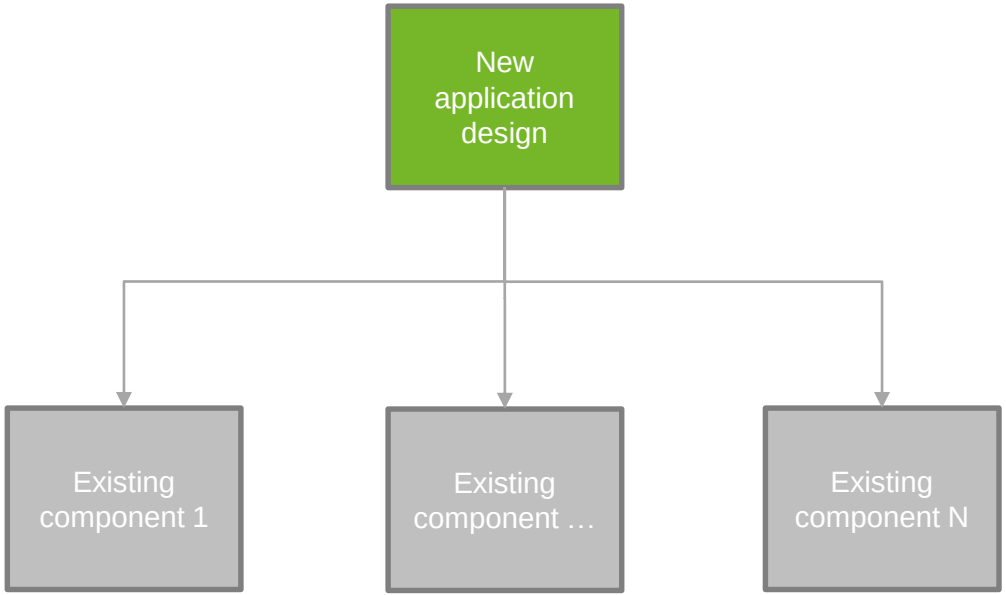
Use Cases – Design Time Performance Evaluations

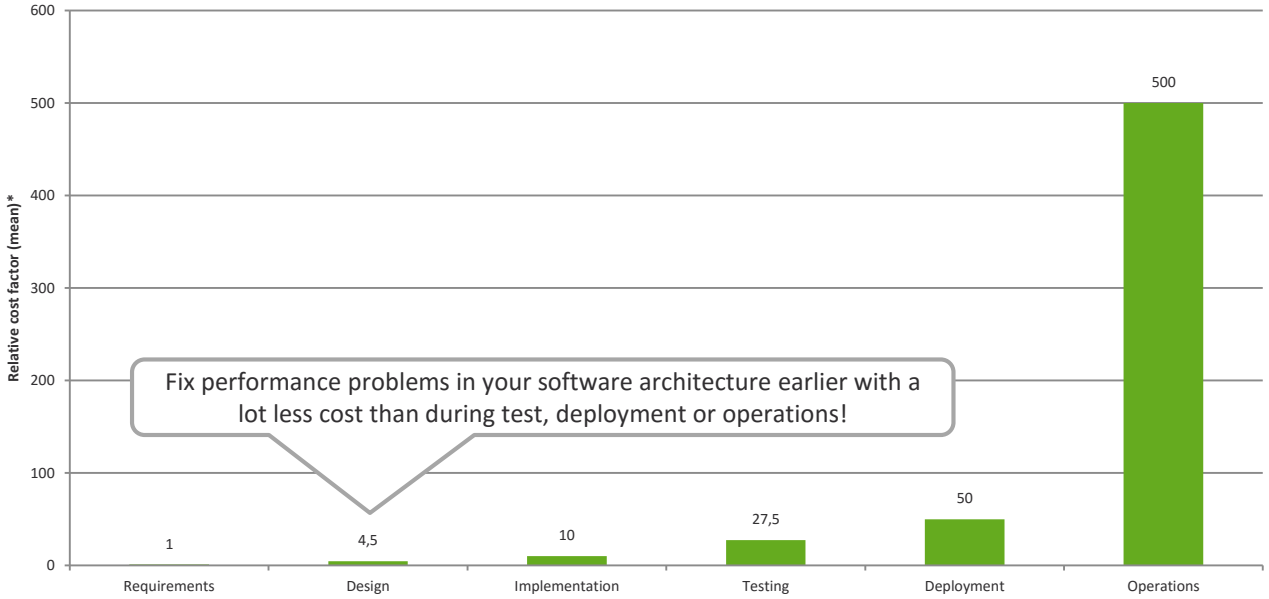


Structure and behaviour defined in design models

Performance-relevant aspects known and depicted in performance models

e.g., minimum response time – even you assume that a new application consumes no time

Benefits – Design Time Performance Evaluations



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Customer Example - Design Time Perf. Evaluations

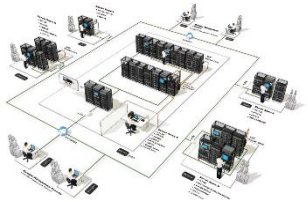
- Evaluating performance in a service-oriented architecture (SOA)

Business

- **Service consumers:**
  - Process-oriented user interfaces
  - Orchestrated by a BPM Engine

Dev

Enterprise Service Bus (ESB)



Ops

- **Service providers:**
  - Common data sources and application services

Customer Example - Design Time Perf. Evaluations

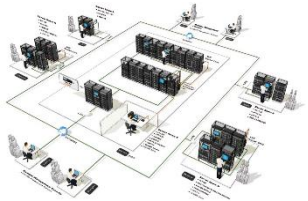
- Evaluating performance in a service-oriented architecture (SOA)

Business

- **Service consumers:**
  - Process-oriented user interfaces
  - Orchestrated by a BPM Engine

- What happens if we introduce/automate new business processes?
- Can you achieve the required response time and business process lead time goals?
- How much does it cost to increase the IT system performance to improve the business process lead times?

Dev



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Customer Example - Design Time Perf. Evaluations

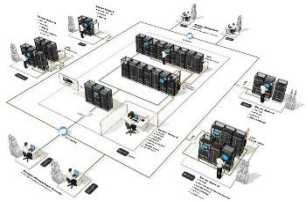
- Evaluating performance in a service-oriented architecture (SOA)

Business

- **Service consumers:**
  - Process-oriented user interfaces
  - Orchestrated by a BPM Engine

- Can we achieve the desired performance and process lead time goals using our existing service-level agreements?
- Which service needs to improve most in order to achieve the business goals?
- Should we negotiate new SLAs with multiple service proviers and ask them to improve their performance slidely or with a few providers but ask for more radical changes?

Dev



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Customer Example - Design Time Perf. Evaluations

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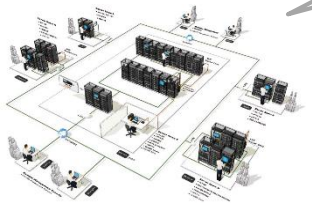
Dev

- How much additional load will new business processes generate?
- Will the existing systems be able to handle the load?
- Do we need to increase our capacity?
- Who pays for the additional capacity?



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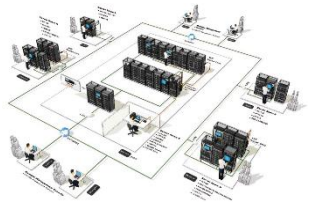
APM Data

Business process descriptions

Software designs for new processes

APM Data

Dev



Ops

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Customer Example - Design Time Perf. Evaluations

- Evaluating performance in a service-oriented architecture (SOA)

Business

- **Service consumers:**
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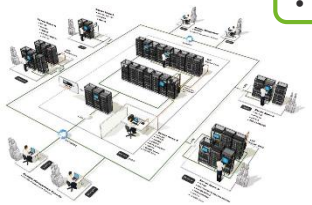
- You can achieve the desired business process lead times but it will cost you …!

- You should talk to service provider XYZ!

Dev

- Your workload will increase by X!
- You should buy … new servers!



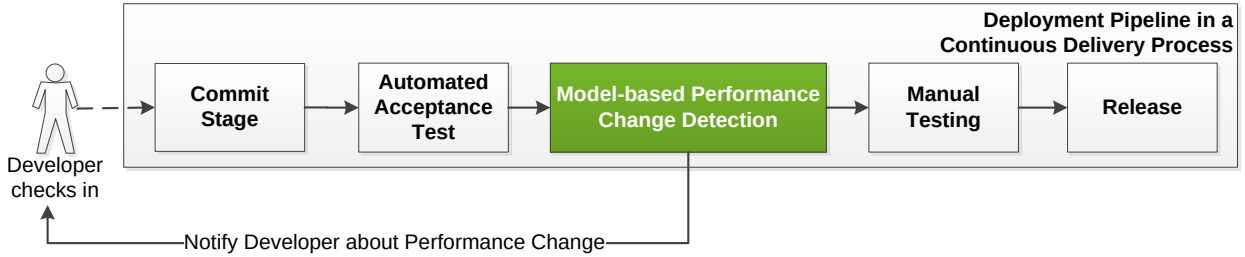
Ops

- **Service providers:**
  - Common data sources and application services

Customer Example - Design Time Perf. Evaluations

- ✓ Modeling **improves** the **collaboration** of all parties involved in the software lifecycle (Business, Dev and Ops)!
- ✓ Business has a level of granularity (business processes) which **eases the communication with the IT department**
- ✓ Service consumers (Dev) can **better estimate the expected response times** for new business processes
- ✓ Service providers (Ops) have **early access to workload information** when new business processes are released

Use Cases – Model-based Evaluations in CD

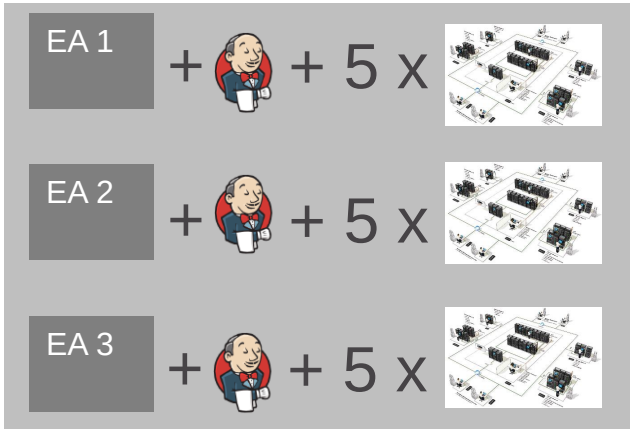


- ✓ Evaluate the impact of feature additions and bug fixes
  - ✓ For multiple hardware environments and workloads
  - ✓ Without the need to own corresponding test systems!

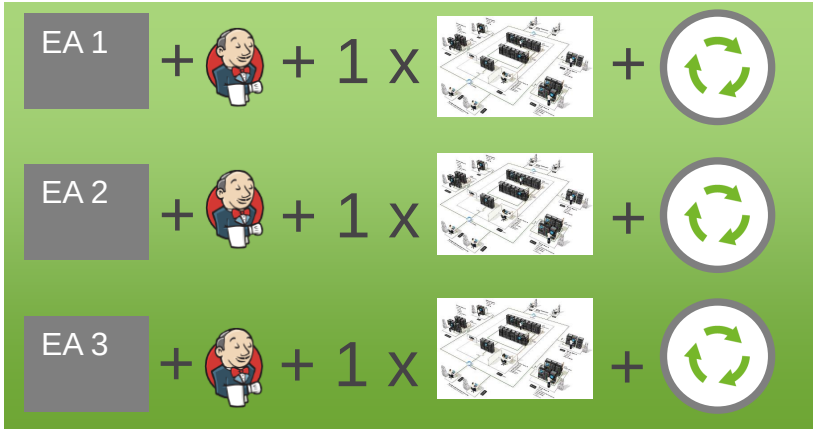
Benefits – Model-based Evaluations in CD

- ✓ Ensure that **no** version gets **released** **with performance regressions**
- ✓ **Leverage cost-benefits** of fixing performance problems early in the development process
- ✓ **Increase** the **performance awareness** of developers by immediate feedback on check-ins
- ✓ **Avoid** the need to setup and prepare load/performance **test environments for each and every project**
- ✓ **Leverage** your **existing** acceptance/regression testing **investments** for performance evaluations

Customer Example – Model-based Evaluations in CD

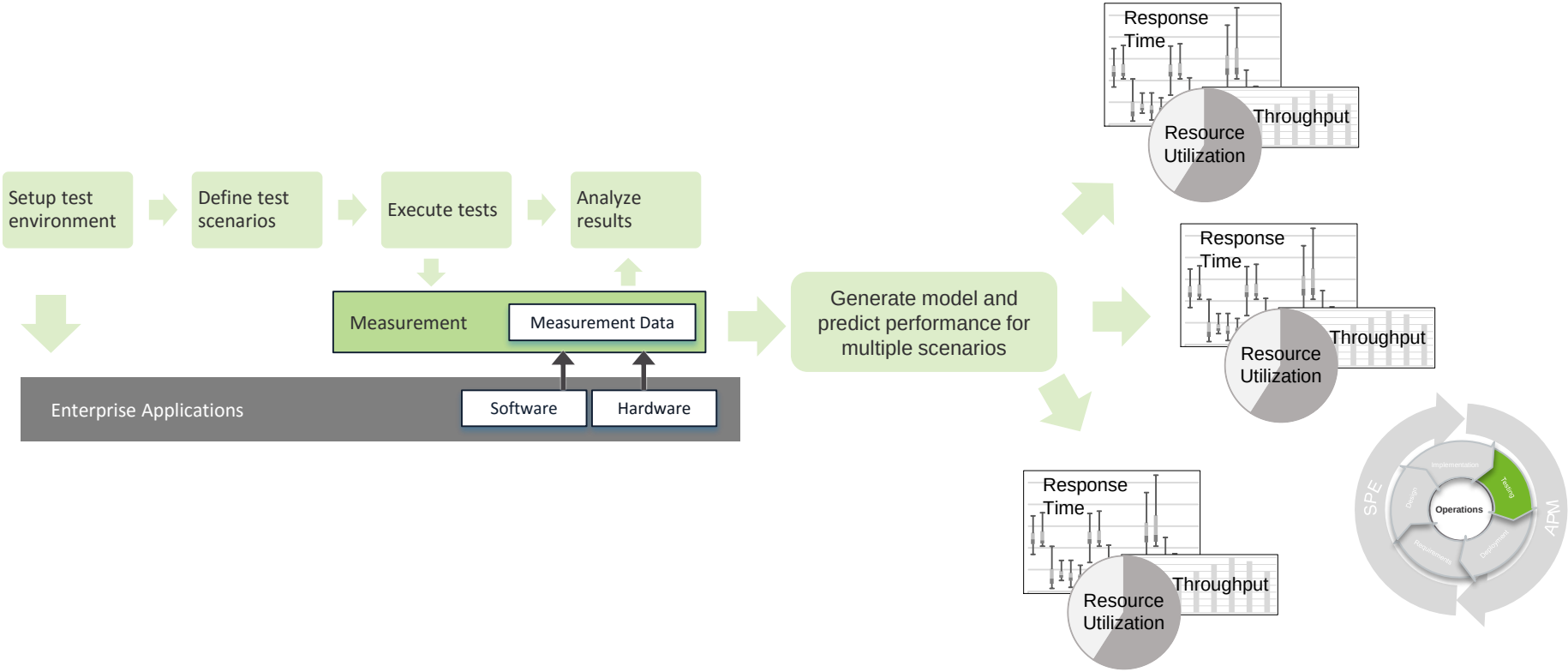


vs.



- A customer (software vendor) has 3 major enterprise applications (EA)
- Needs to test 5 workload and hardware scenarios per EA
  - Using RETIT Continuous Delivery (RCD) reduces just the operation cost by 250.000 € / year

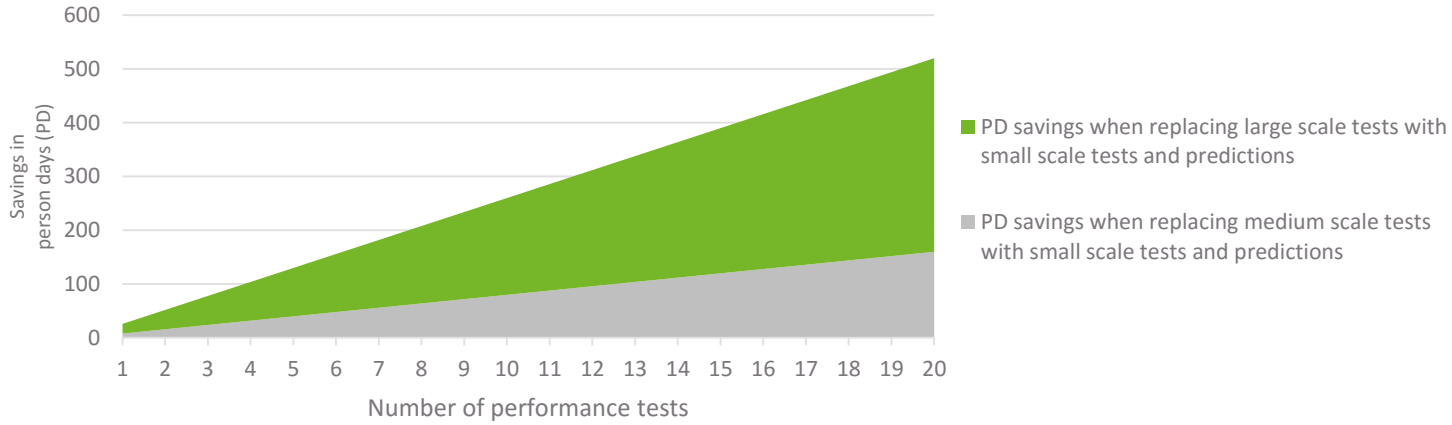
Use Cases – Integrating Load Tests w/ Predictions



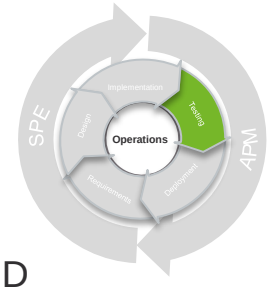
Benefits – Integrating Load Tests w/ Predictions

- ✓ **Save cost** by reducing the amount of load/performance tests
- ✓ **Increase** the **coverage** of your tests
- ✓ **Evaluate scenarios without** buying the corresponding **hardware**
- ✓ Easily **extend** the **coverage as the deployment count** of your application **increases**

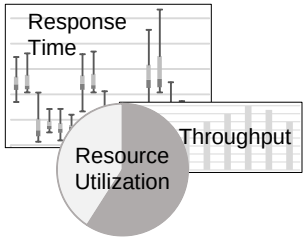
Customer Example – Integrating LT with Predictions



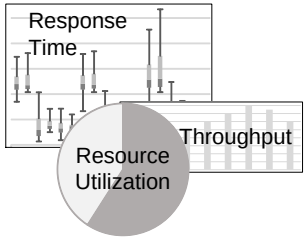
- Replacing one medium or large scale load test by a small scale test with predictions saves between 8 and 26 PD (assuming 2 PD for predictions)
  - Effort for load tests (incl. script development, test setup, execution,..):
  - Small scale: 13 person days (PD), medium scale 23 PD, large scale: 41 PD



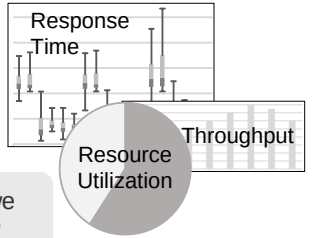
Use Cases – Model-based Capacity Management



How much capacity is required if we have ten-times more users during Christmas season?

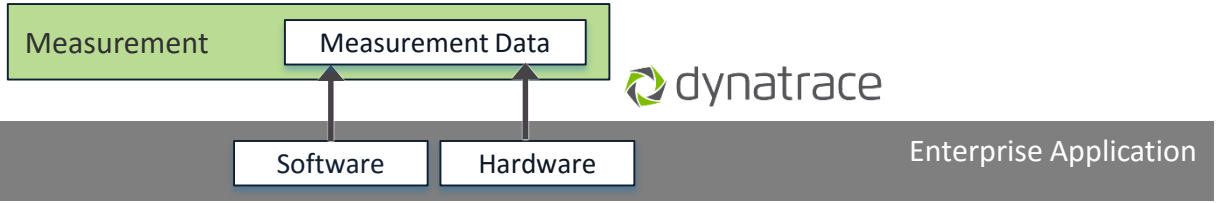


What happens if we change our deployment topology?



What happens if we migrate to AWS?

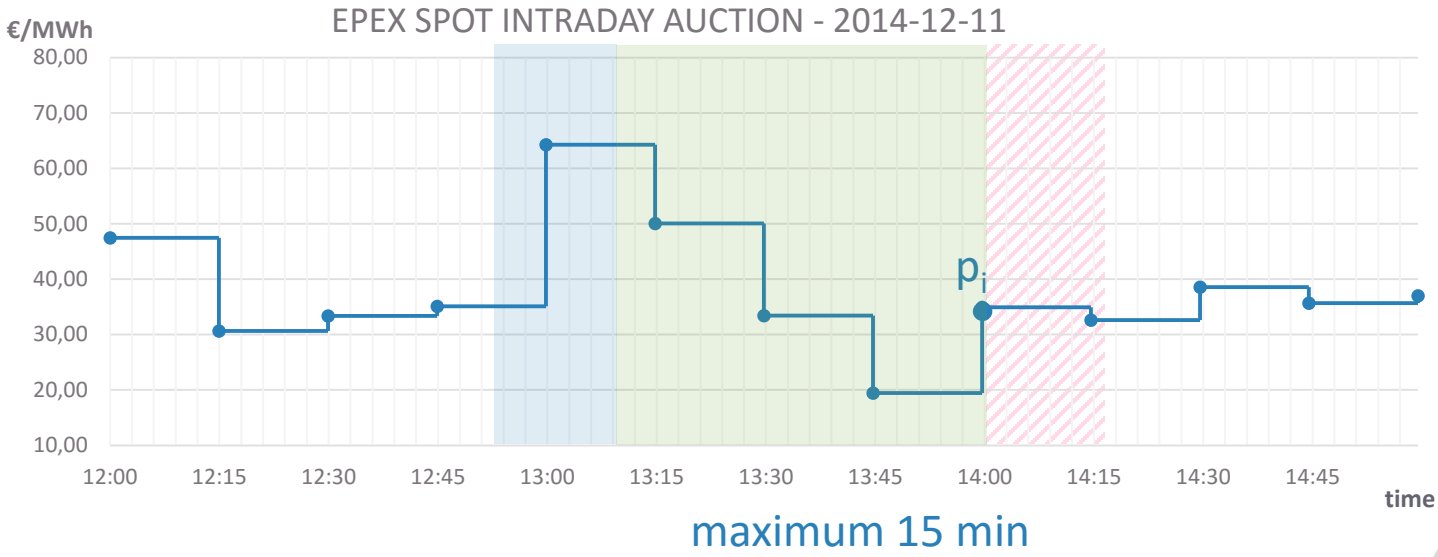
Generate model based on production data and predict performance for future scenarios.



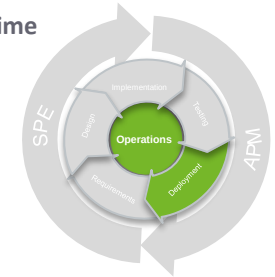
Benefits – Model-based Capacity Management

- ✓ **Right-size your environments** to pay only for what you really need
- ✓ **Avoid** the need to setup **expensive test environments** to evaluate changes
- ✓ **Reduce risk** for hardware environment (e.g., cloud) migrations
- ✓ **Reduce** the **time** for capacity management activities
- ✓ **Increased accuracy** as the simulations avoid the need for linear assumptions

Customer Example – Model-based CM



- Smart Grid Capacity Planing for several million households



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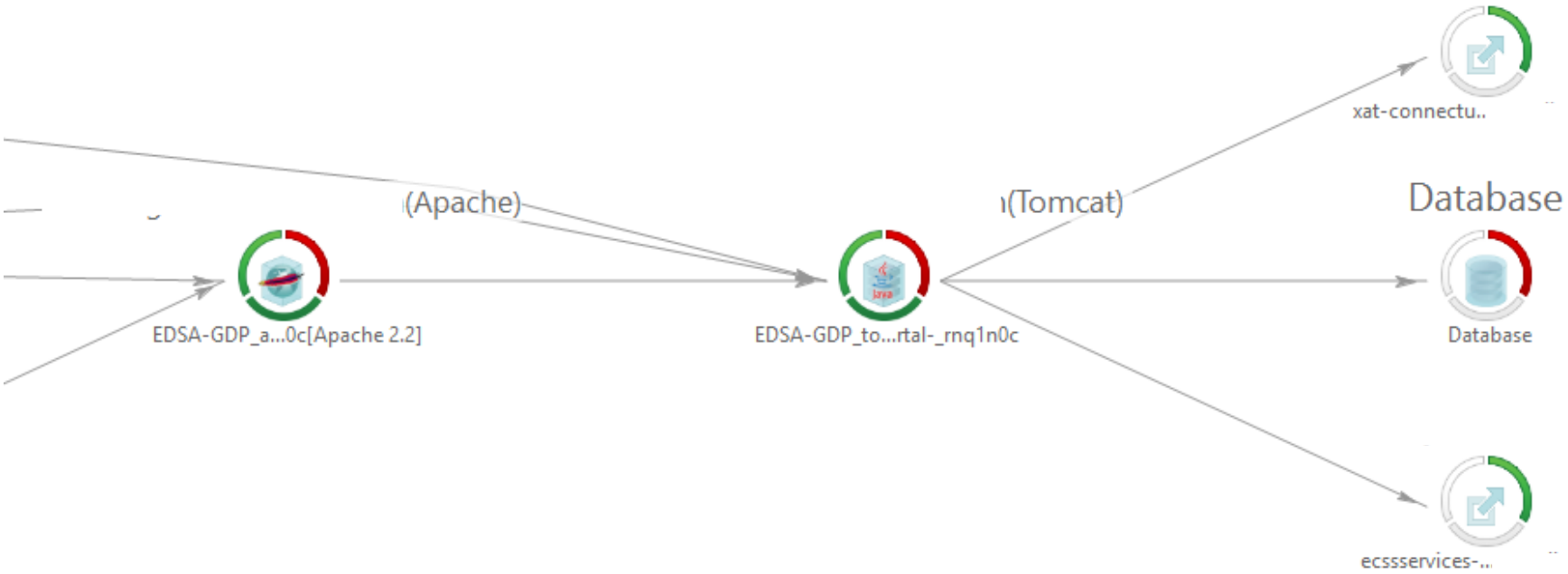
RETIT Solution Demo

- **Demo**

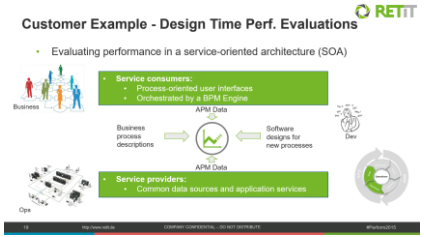
RETIT Solution Demo – Example Transaction Flow



Summary

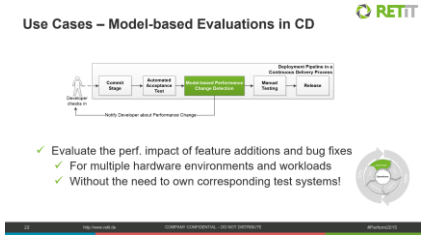
- What did we learn today?
  - Performance modeling…

✓ **Improves cross-team collaboration**



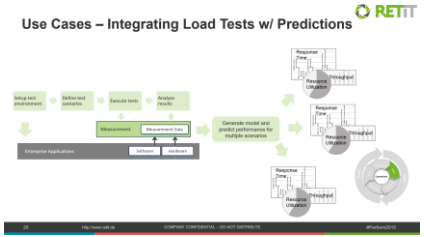
…by integrating multiple data sources

✓ **Increases performance awareness**



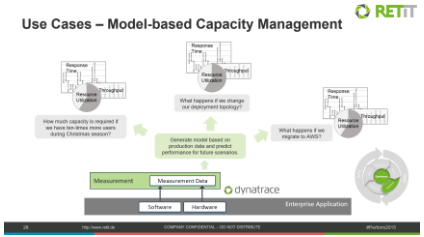
… through immediate feedback during development.

✓ **Extends test coverage**



… by allowing you to test more workloads and hardware environments.

✓ **Saves cost**



… by taking the guess-work out of capacity planning activities.

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Resource Efficient Technologies & IT Systems