Quality-Aware Development of Big Data Applications with DICE

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The Rise of Big Data

- Software market rapidly shifting to Big data
  - Expected 32% compound annual growth rate in EU through 2016
  - Just 35% of Big data projects are successful [CapGemini’15]
The Rise of Big Data: Data-Intensive Applications (DIA)

Data

- Value
- Volume
- Transfer
- Location
- Velocity
- Privacy

Technologies

- NoSQL
- Hadoop
- Storm
- DBaaS
- Spark
- Cloud

Methods & Tools

- UML
- Integration
- Prototyping
- Quality
- DevOps

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DIAs live in DevOps contexts!

- Continuous DIA architecting;
- Infrastructure-as-code (e.g., TOSCA*) to allow track/update of “deployment” architectures;

*Topology and Orchestration Specification for Cloud Applications (TOSCA) OASIS industry standard.
MDE for Big Data, the DICE vision and approach

- **DevOps**

- **Model-Driven Engineering**
  - Deployment blueprint
  - Analysis
MDE for Big Data, the DICE vision and approach → DevOps!

- DevOps is “A set of practices and tools to reduce the time to commit a change to production, while ensuring high-quality.” (Bass et al., ’15)
MDE for Big Data, the DICE vision and approach → MDE!

A single model…

Model

... transformations ...

... transformations ...

... transformations ...

... many targets

Other models

Analysis tools

TOSCA blueprint

Code or scripts
MDE and DevOps: a possible synergy in DICE

DevOps
- Model
- Analysis
- Blueprint
- Feedback
- Test cases
- Stress testing
- Fault injection
- Deployment
- Monitoring
- Deployment
- Monitoring

QA – Quality Assurance

Development & IT Operations

Development
- Continuous Integration

Testing
- Continuous Testing

Production
- Continuous Monitoring

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DICE, a Complete MDE Toolkit for DIAs*

DICE incremental modeling and analysis[6]

- **DICE Platform Independent Model (DPIM)**
  - M2M transformation
  - is implemented by Analysis

- **DICE Technology Specific Model (DTSM)**
  - M2M transformation
  - is deployed onto Analysis & Optimization

- **DICE Deployment Specific Model (DDSM)**
  - M2T transformation
  - TOSCA blueprint

- To provide sound abstractions and UML Profile for DIAs
- To provide a sound method for:
  - DICE-based Continuous DIA Architecting
  - DICE-based Continuous DIA Deployment
Thanks!

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