Pattern-based Deployment Models Revisited: Automated Pattern-driven Deployment Configuration

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About me: Lukas Harzenetter

- Research associate at the University of Stuttgart, Institute of Architecture of Application Systems (IAAS)
- Master of Science in Software Engineering, 2018
- Funded by the German Research Foundation (DFG) project SustainLife
  - Enhancing the sustainability and longevity of research applications in the domain of digital humanities
- Research interests:
  - Cloud Computing
  - Deployment Automation
  - Deployment Models

Deployment and Configuration Automation

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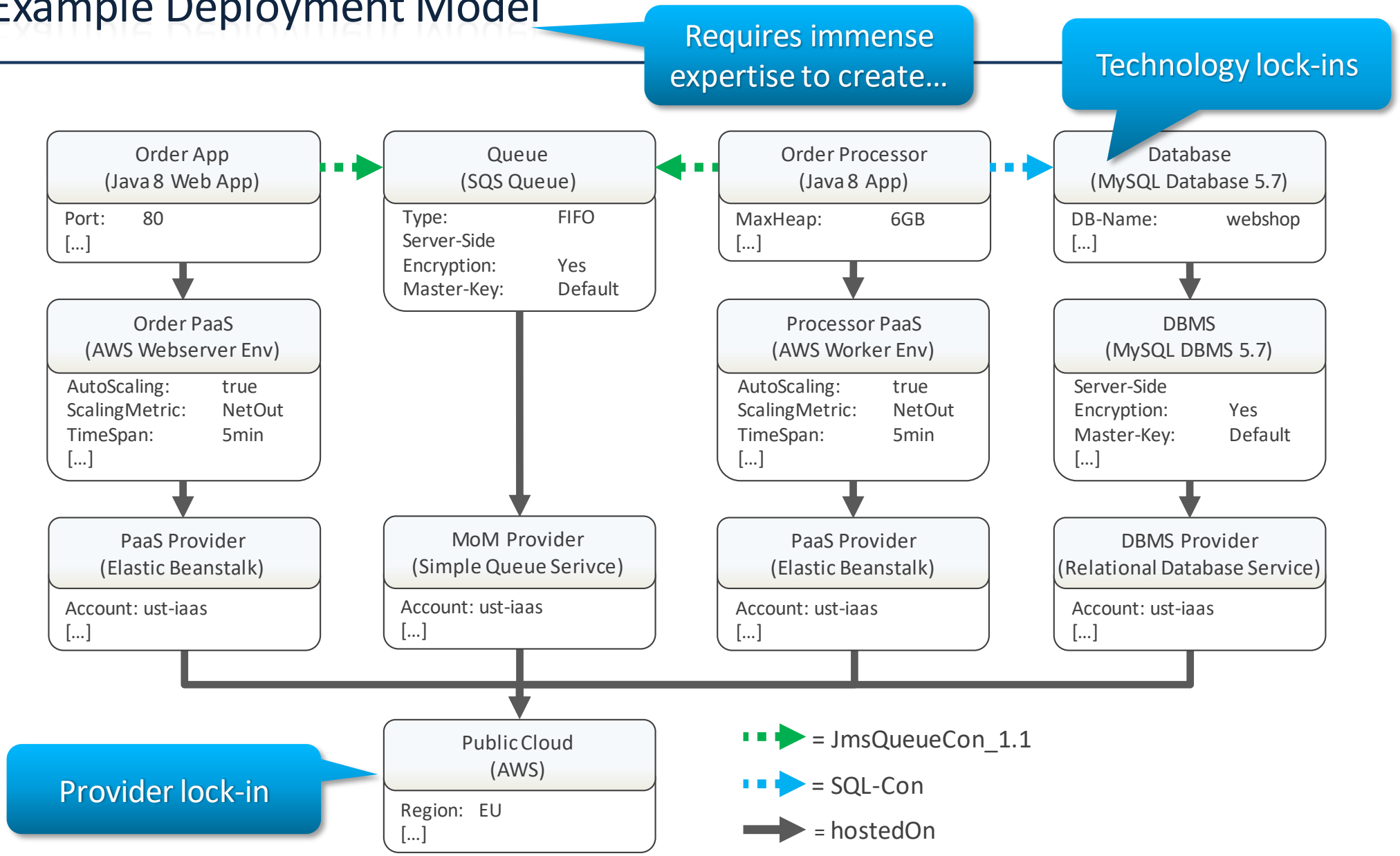
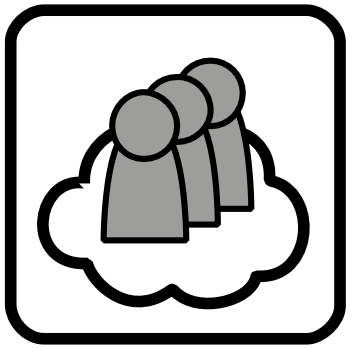
Example Deployment Model

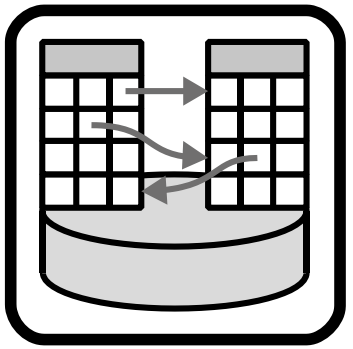


Patterns

- Pattern: Proven concept & solution to a recurring problem
  - Context & problem description
  - Abstract solution
  - Icon
- Domain specific:
  - Cloud Computing Patterns by Fehling et al. [1]
  - Enterprise Integration Patterns by Hohpe and Woolf [2]
  - Security Patterns by Schumacher et al. [3]



Public Cloud [1]



Relational Database [1]

(1) C. Fehling, F. Leymann, R. Retter, W. Schupeck, and P. Arbitter: **Cloud Computing Patterns: Fundamentals to Design, Build, and Manage Cloud Applications**. Springer, Jan. 2014

(2) G. Hohpe and B. Woolf: **Enterprise Integration Patterns: Designing, Building, and Deploying Messaging Solutions**. Addison-Wesley, 2004

(3) M. Schumacher, E. Fernandez-Buglioni, D. Hybertson, F. Buschmann, and P. Sommerlad: **Security Patterns: Integrating Security and Systems Engineering**. John Wiley & Sons, Inc., Jan. 2006

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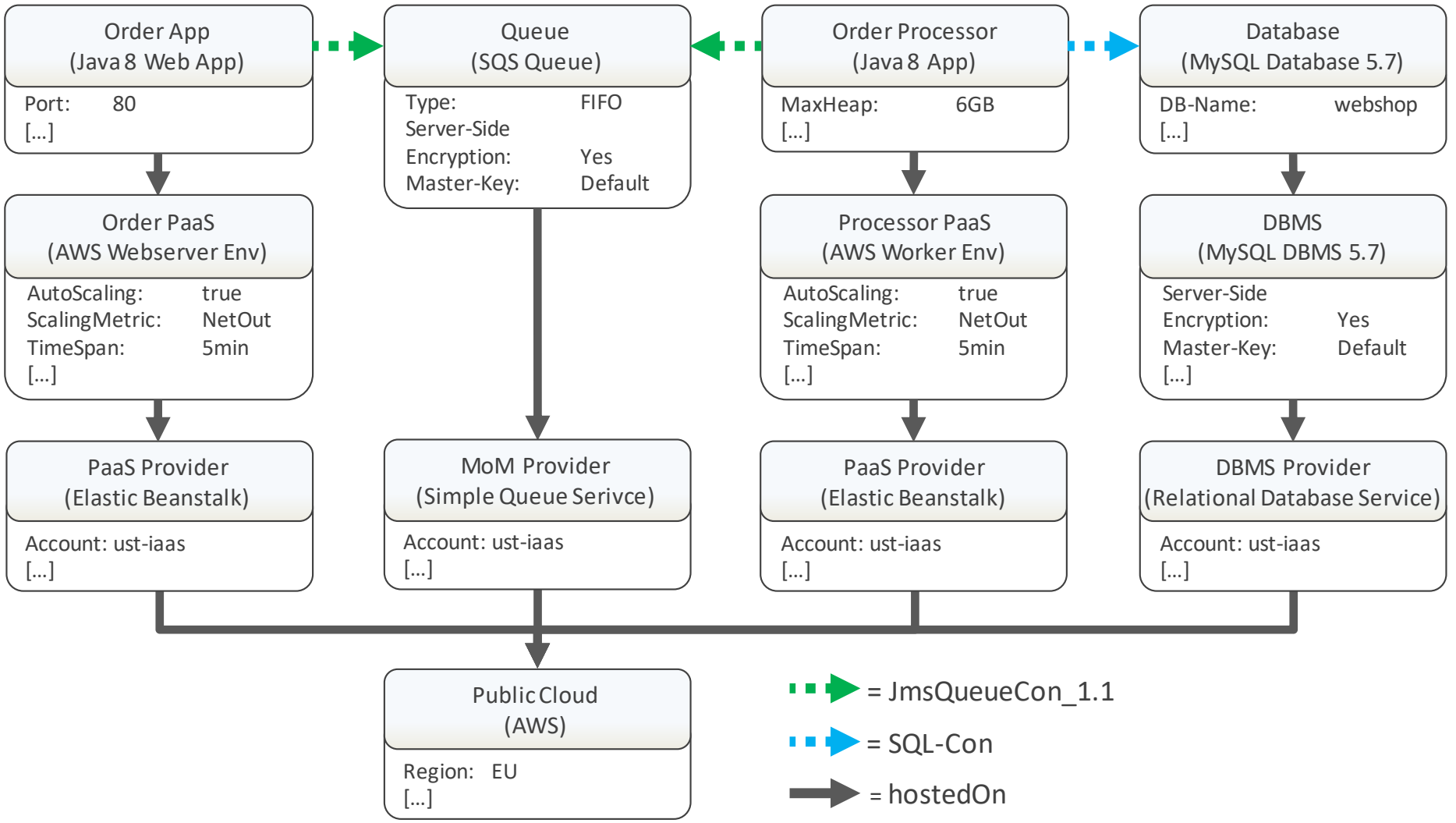

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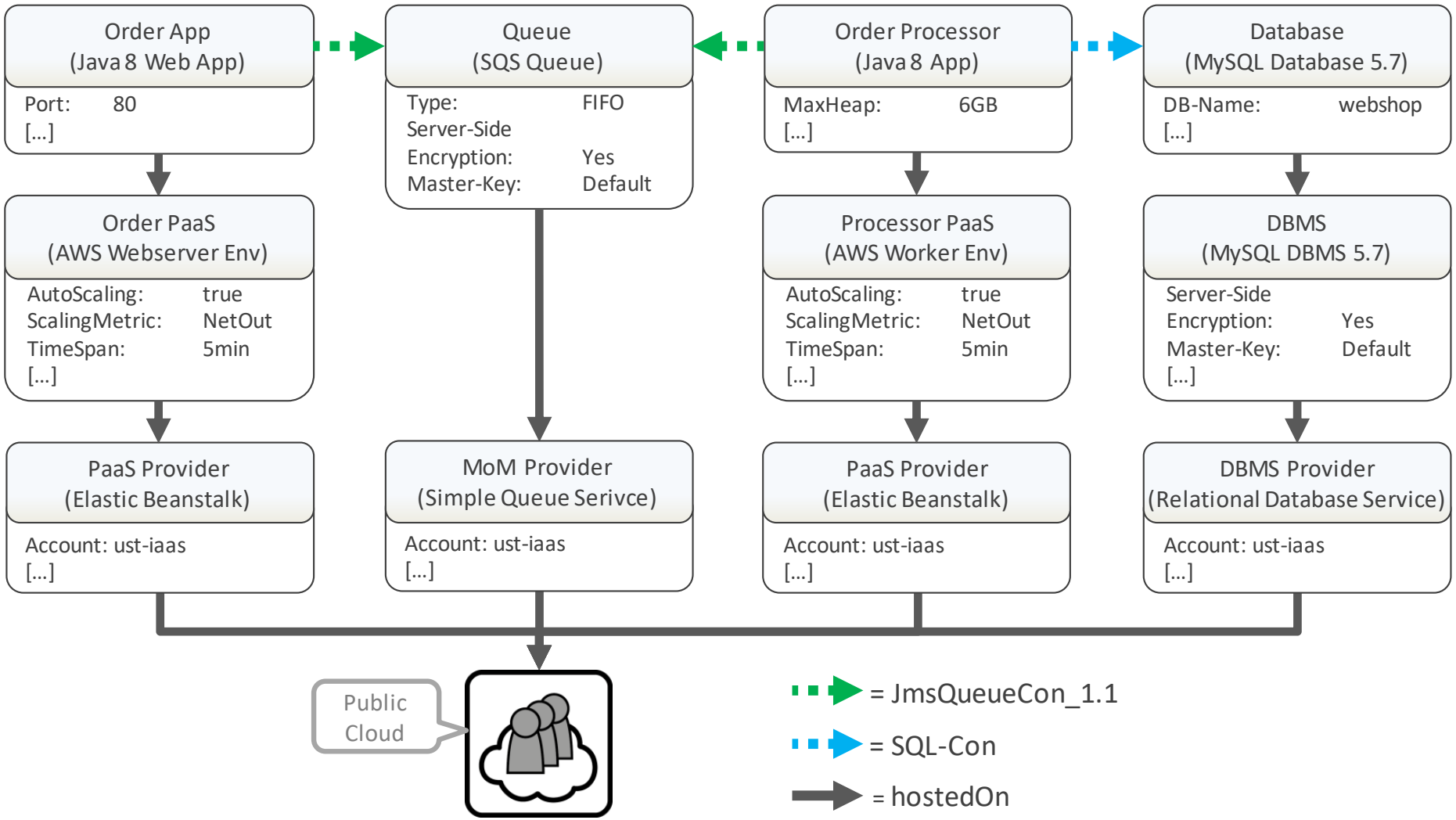

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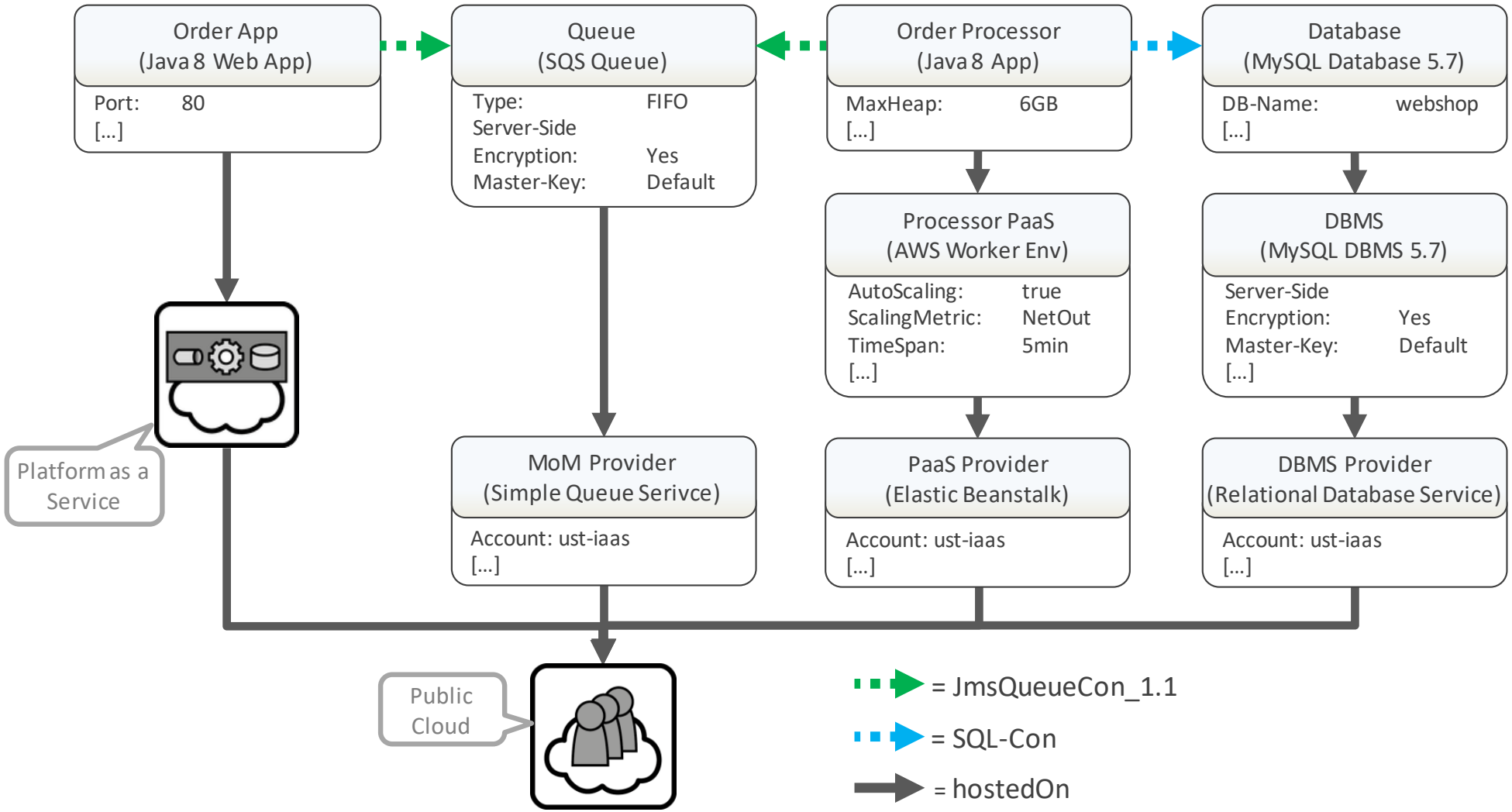

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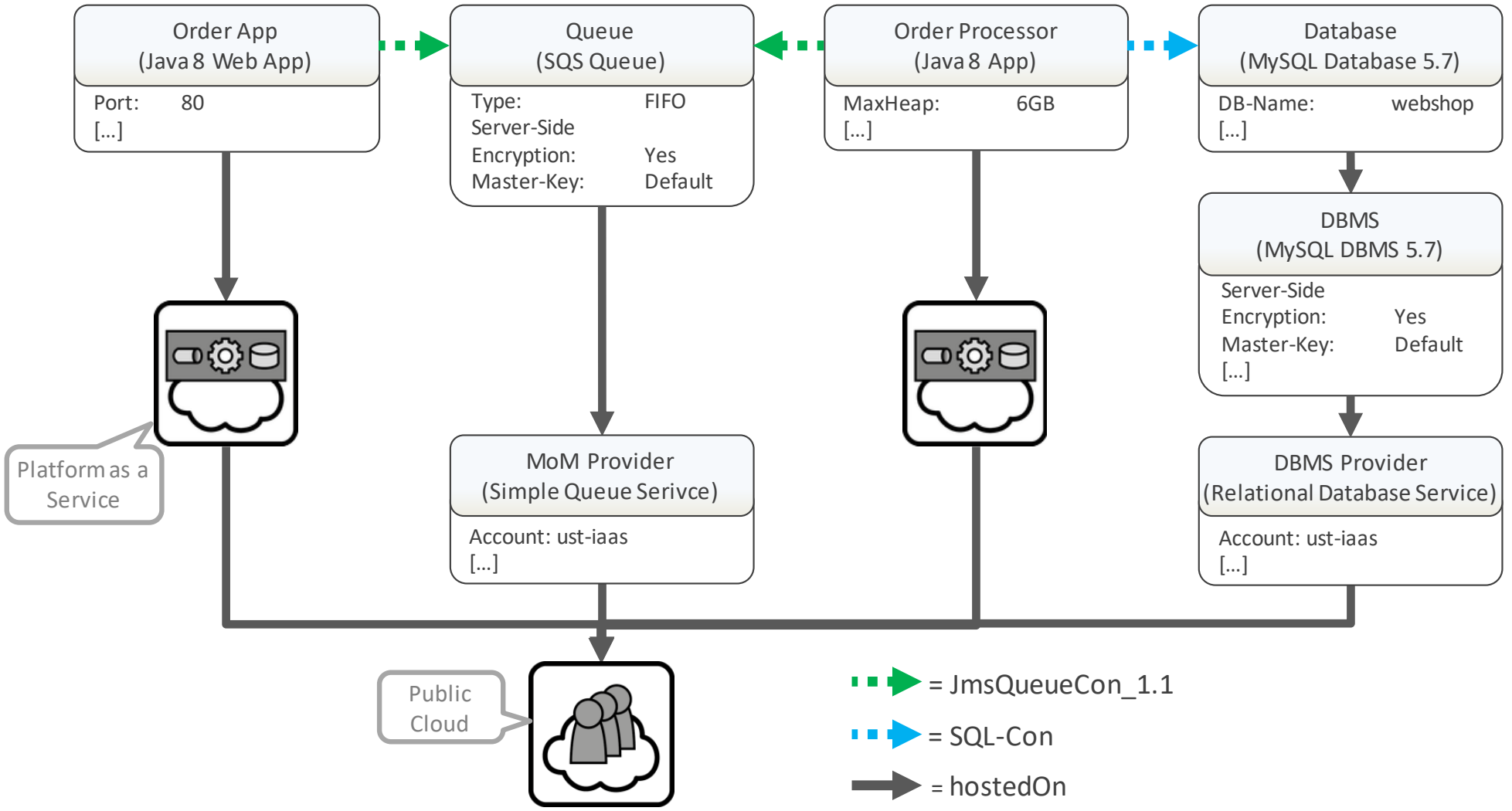

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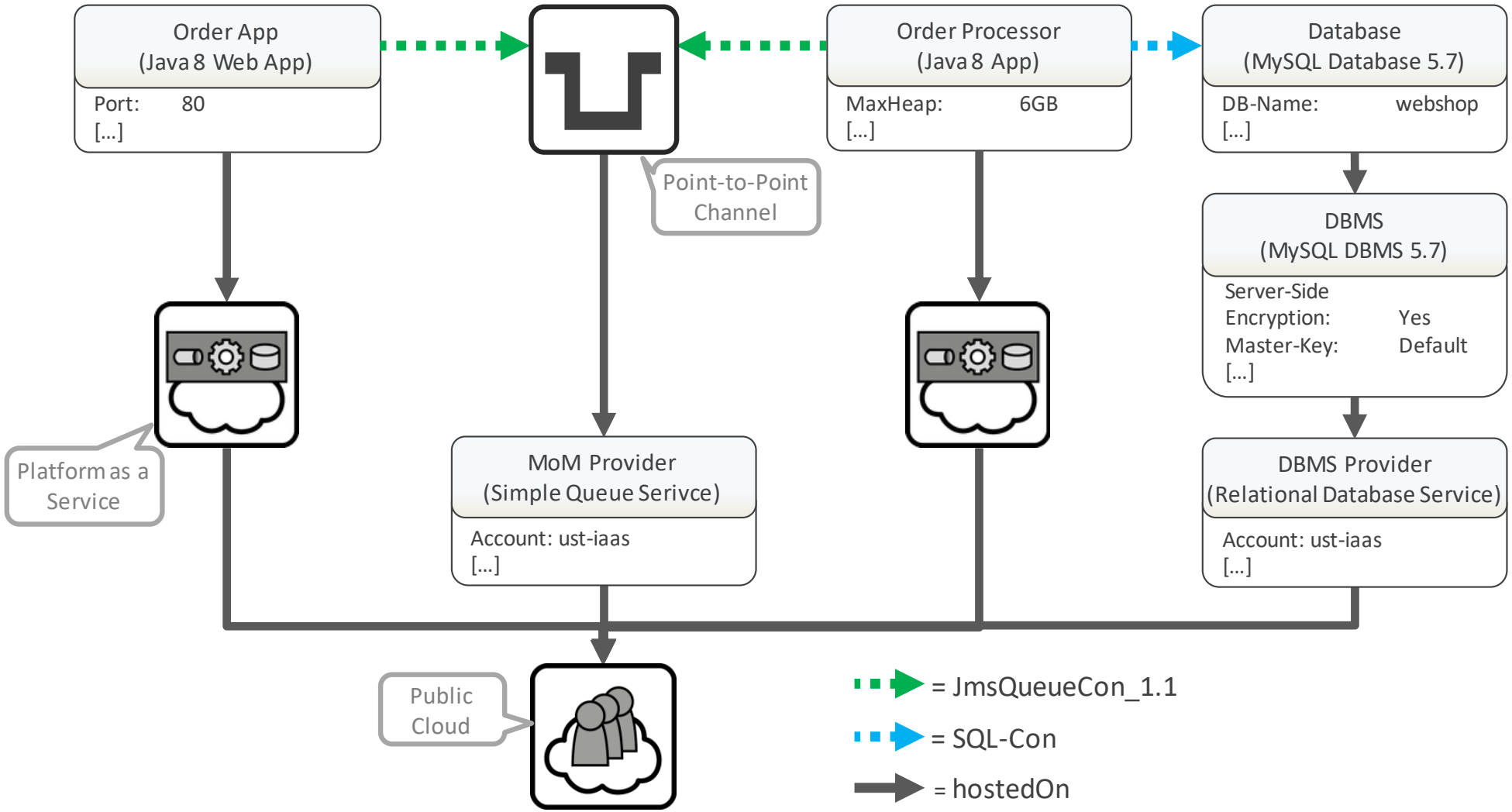

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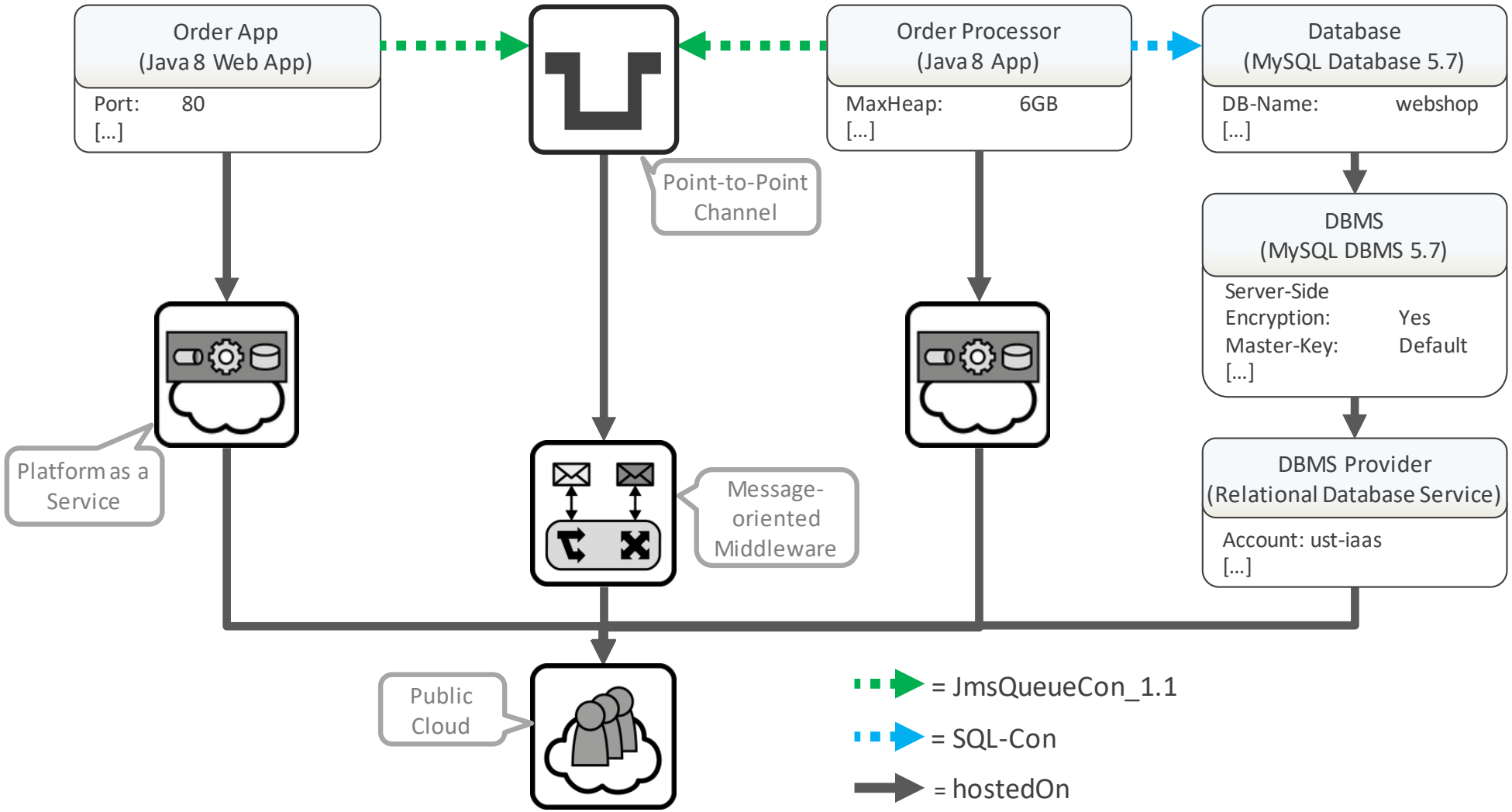

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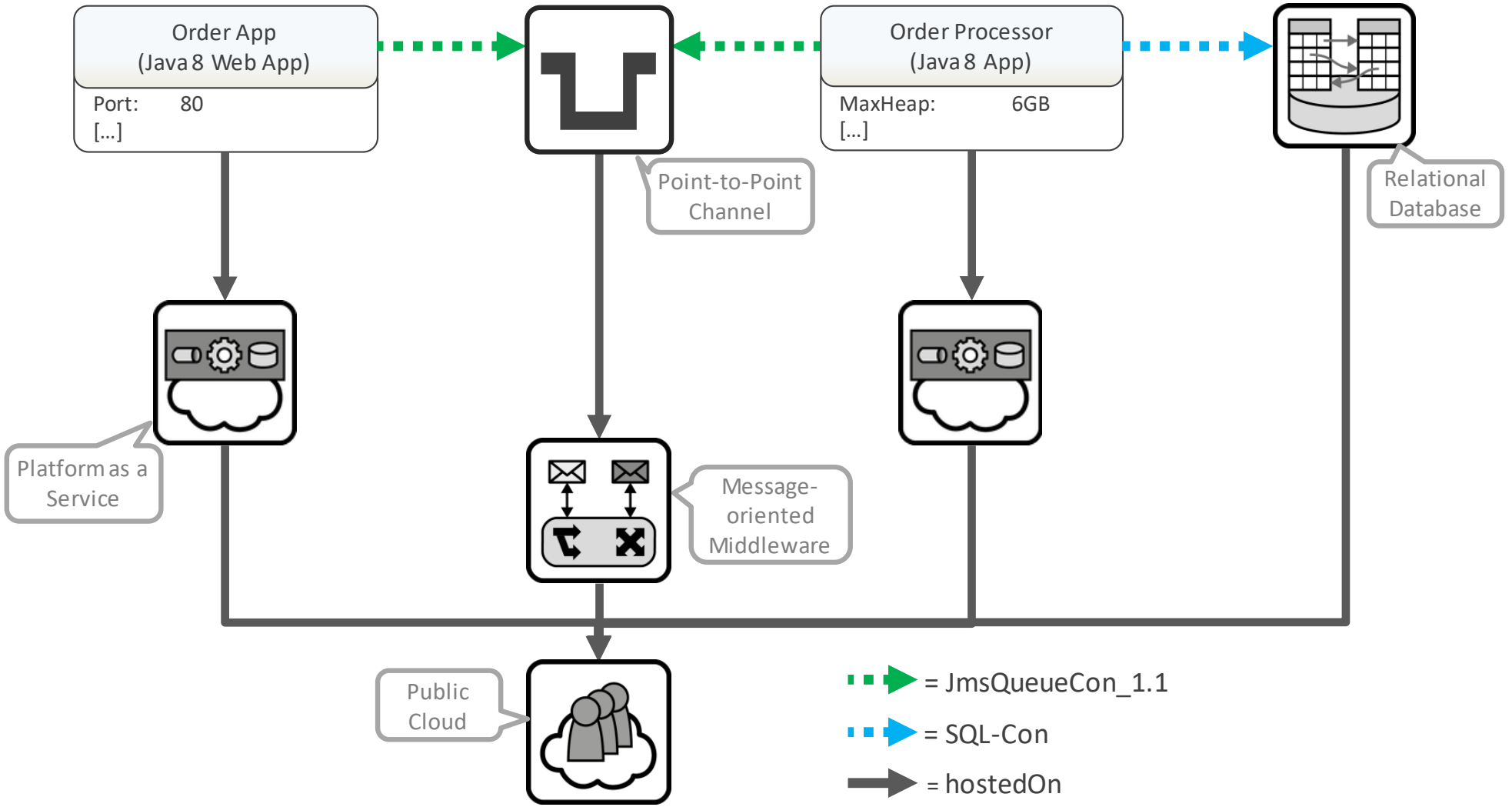
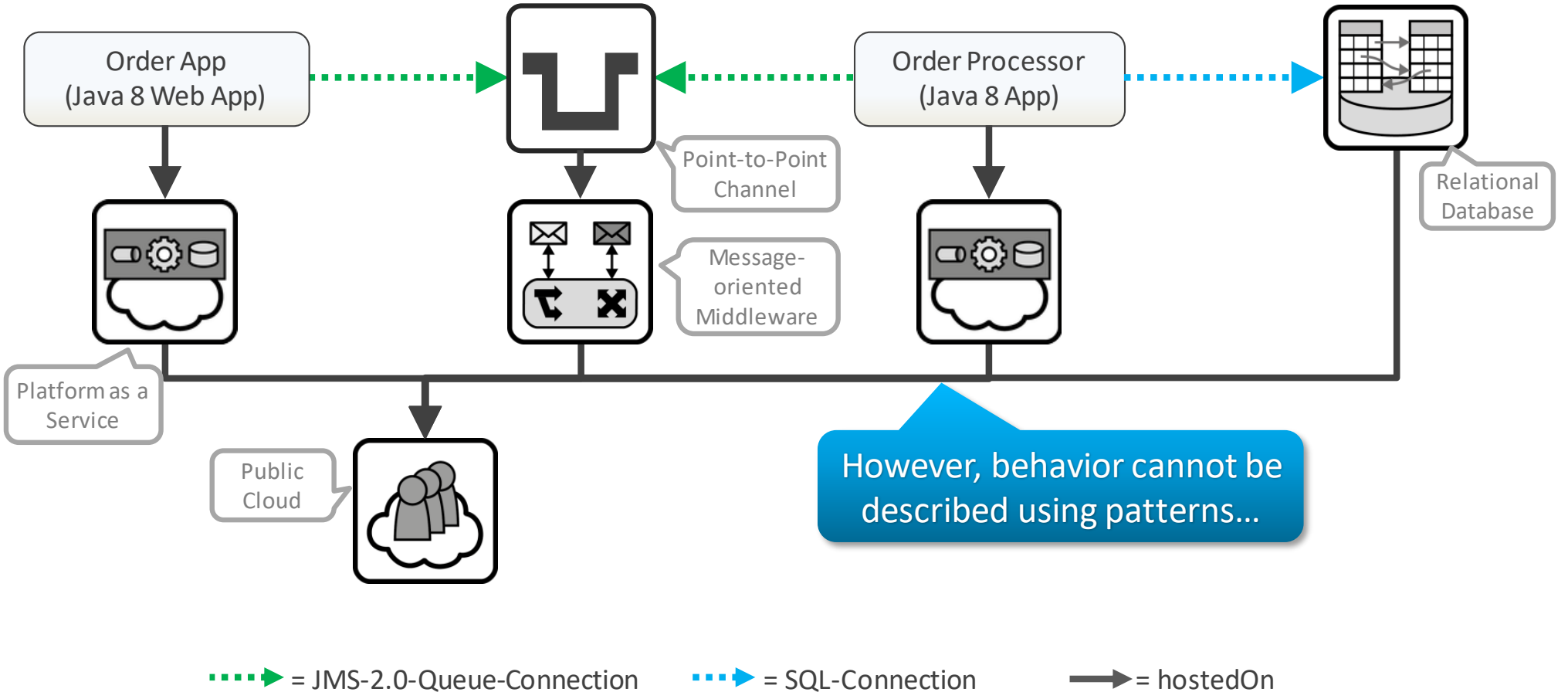


Pattern-based Deployment Models [4]

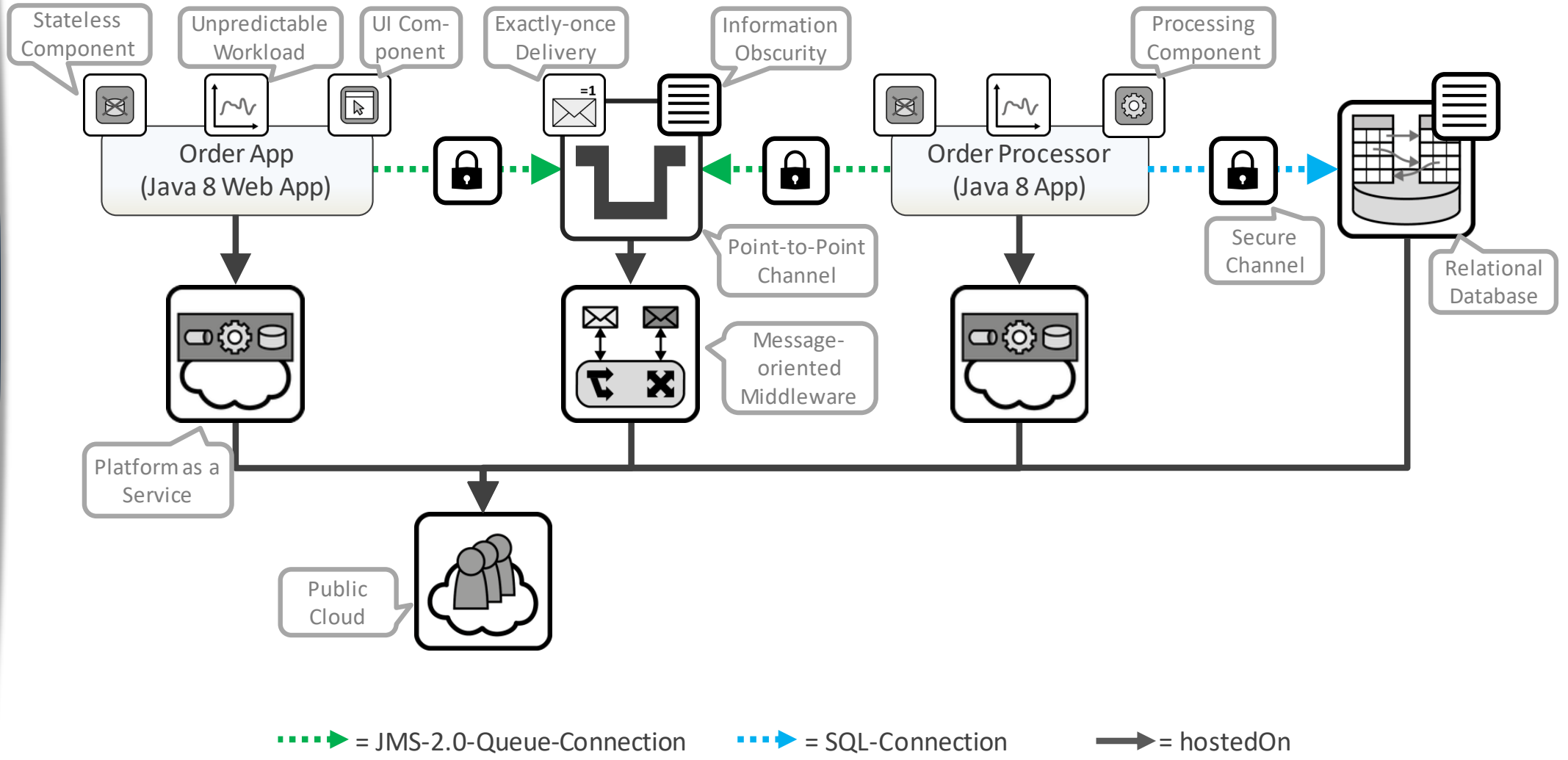
Describing semantics rather than technologies

(4) Harzenetter, Lukas; Breitenbücher, Uwe; Michael, Falkenthal; Guth, Jasmin; Krieger, Christoph; Leymann, Frank: **Pattern-based Deployment Models and Their Automatic Execution**. In: 11th IEEE/ACM International Conference on Utility and Cloud Computing (UCC 2018), IEEE Computer Society, 2018



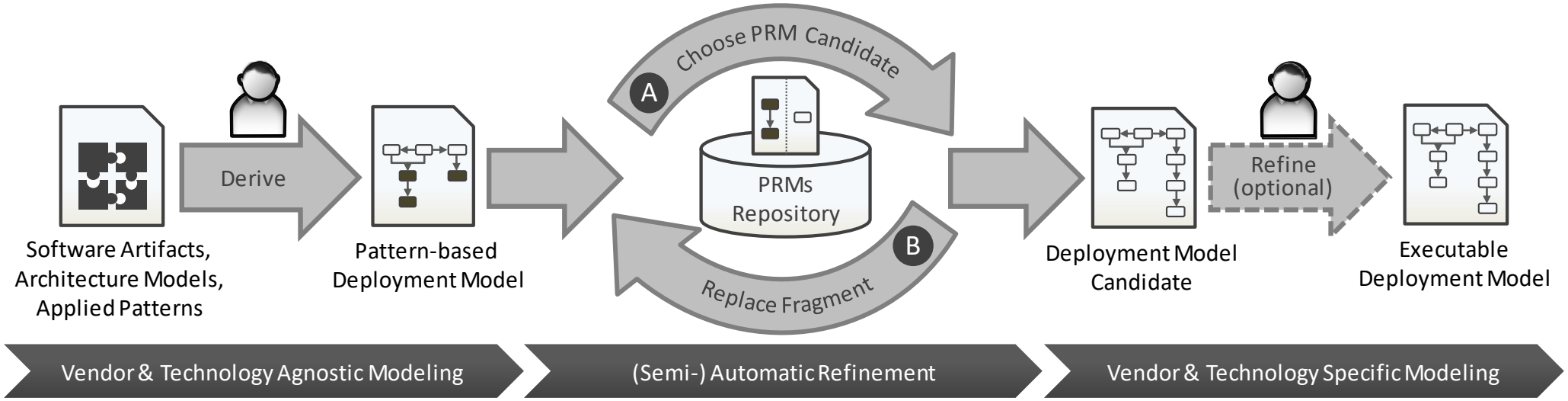
Pattern-based Deployment and Configuration Models

Pattern-based Deployment and Configuration Models (PbDCMs)



How to deploy an application that is modelled in the form of a PbDCM?

Pattern-based Deployment Modelling Method



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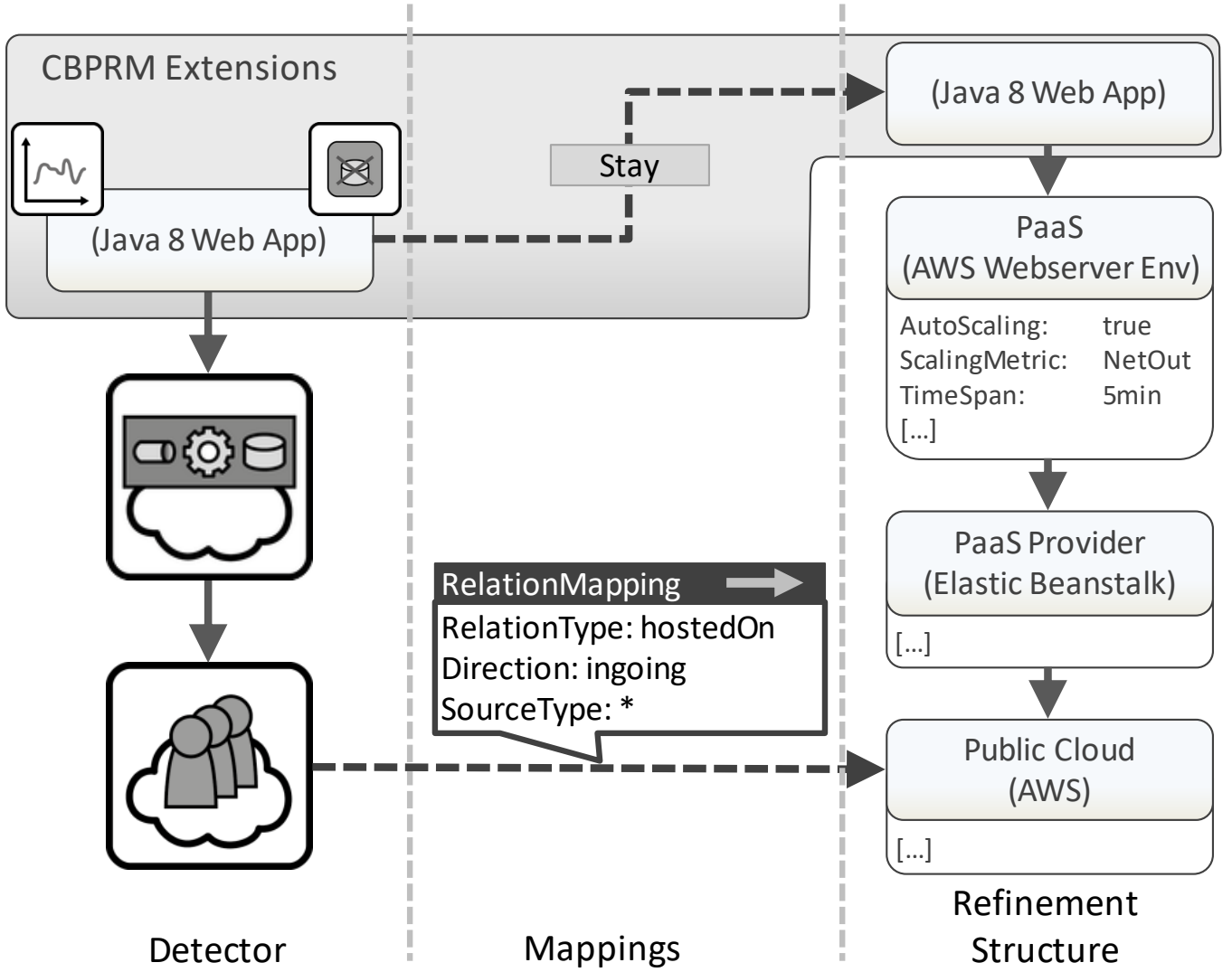
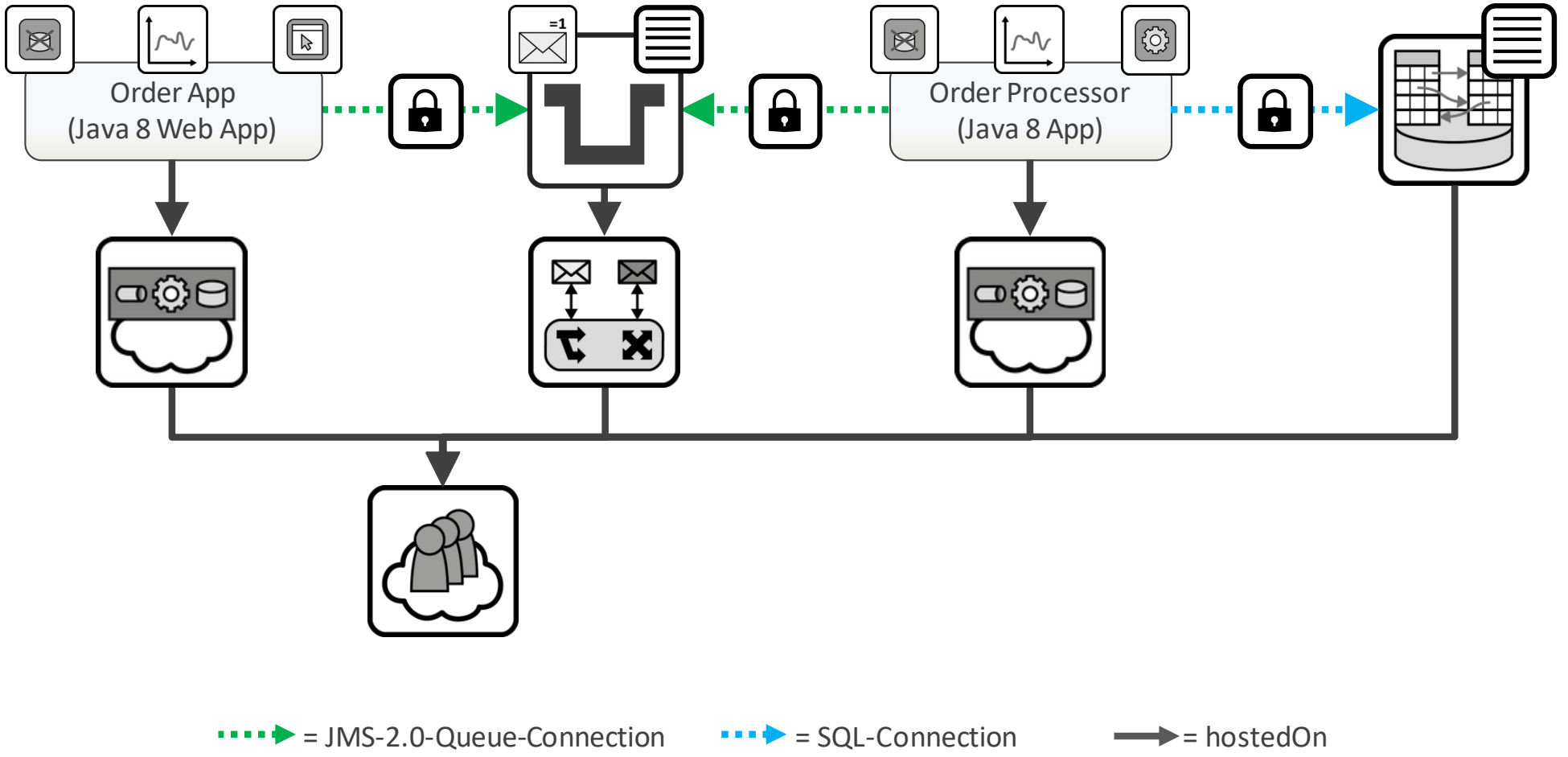
Component and Behavior Pattern Refinement Model (CBPRM)



Pattern-based Deployment and Configuration Models – Refinement



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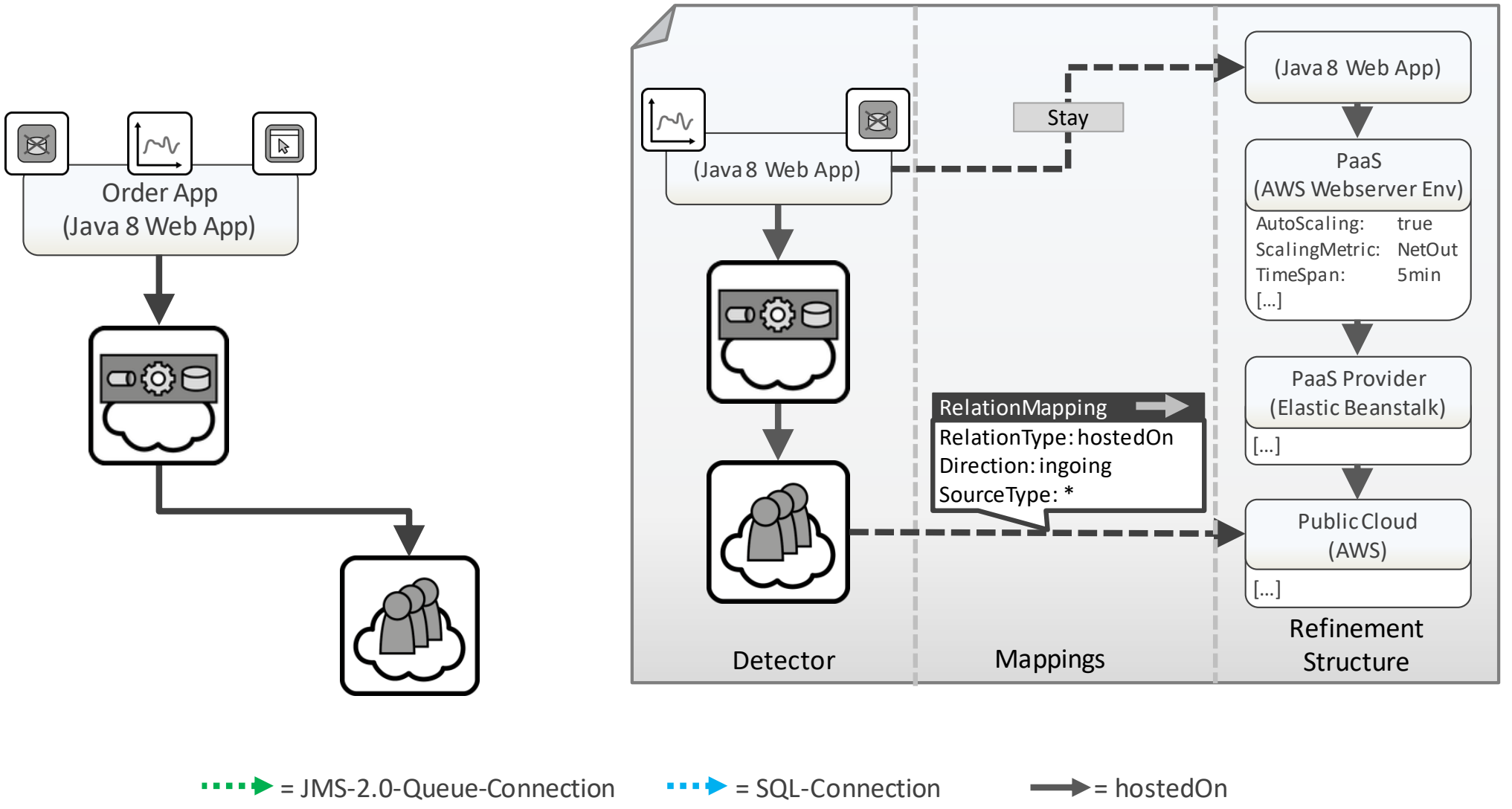

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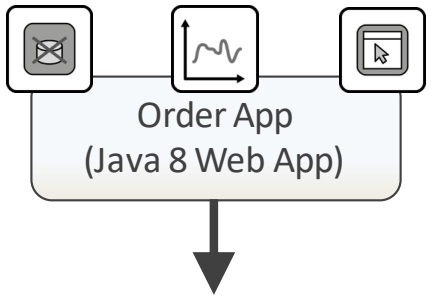

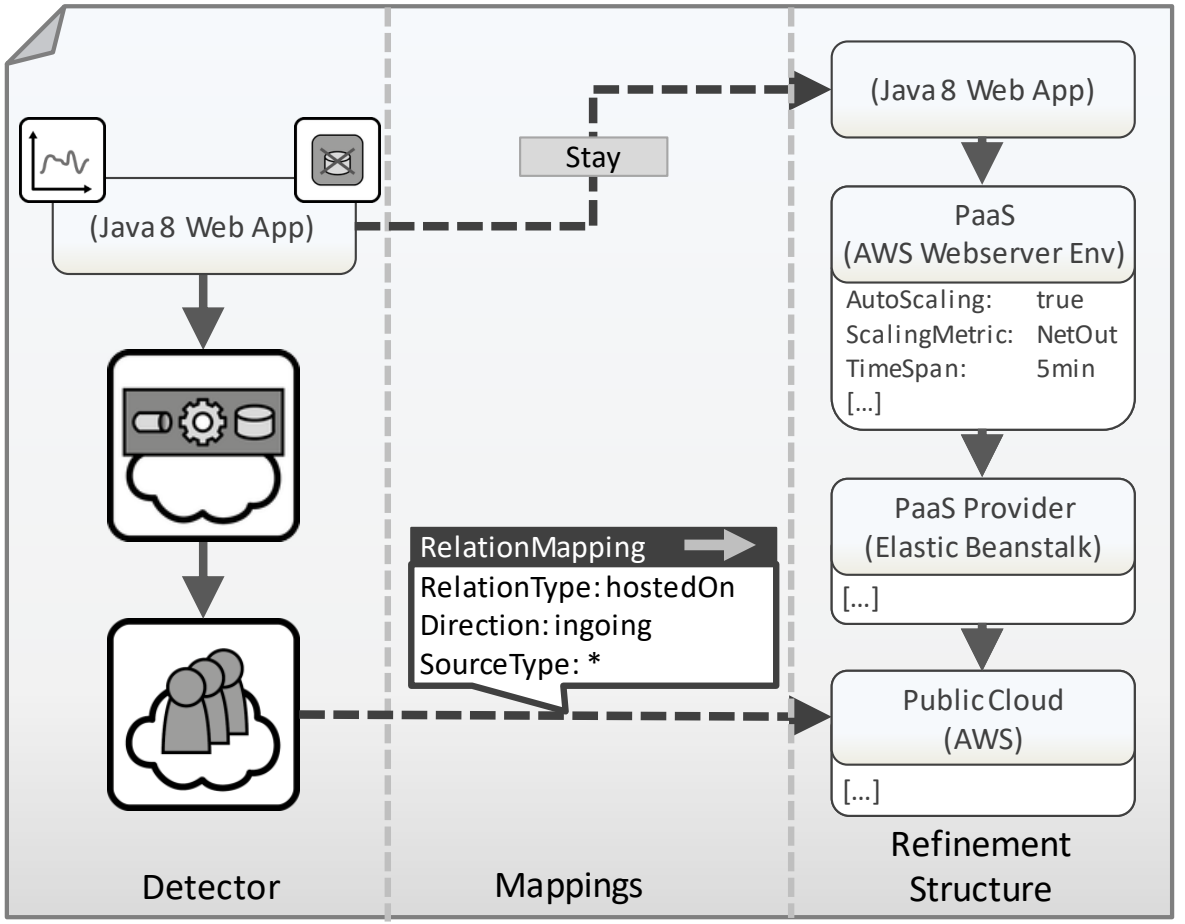

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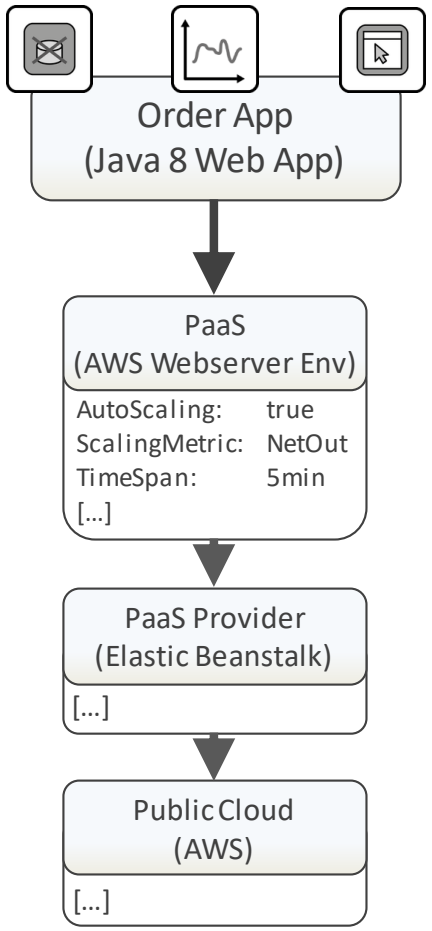

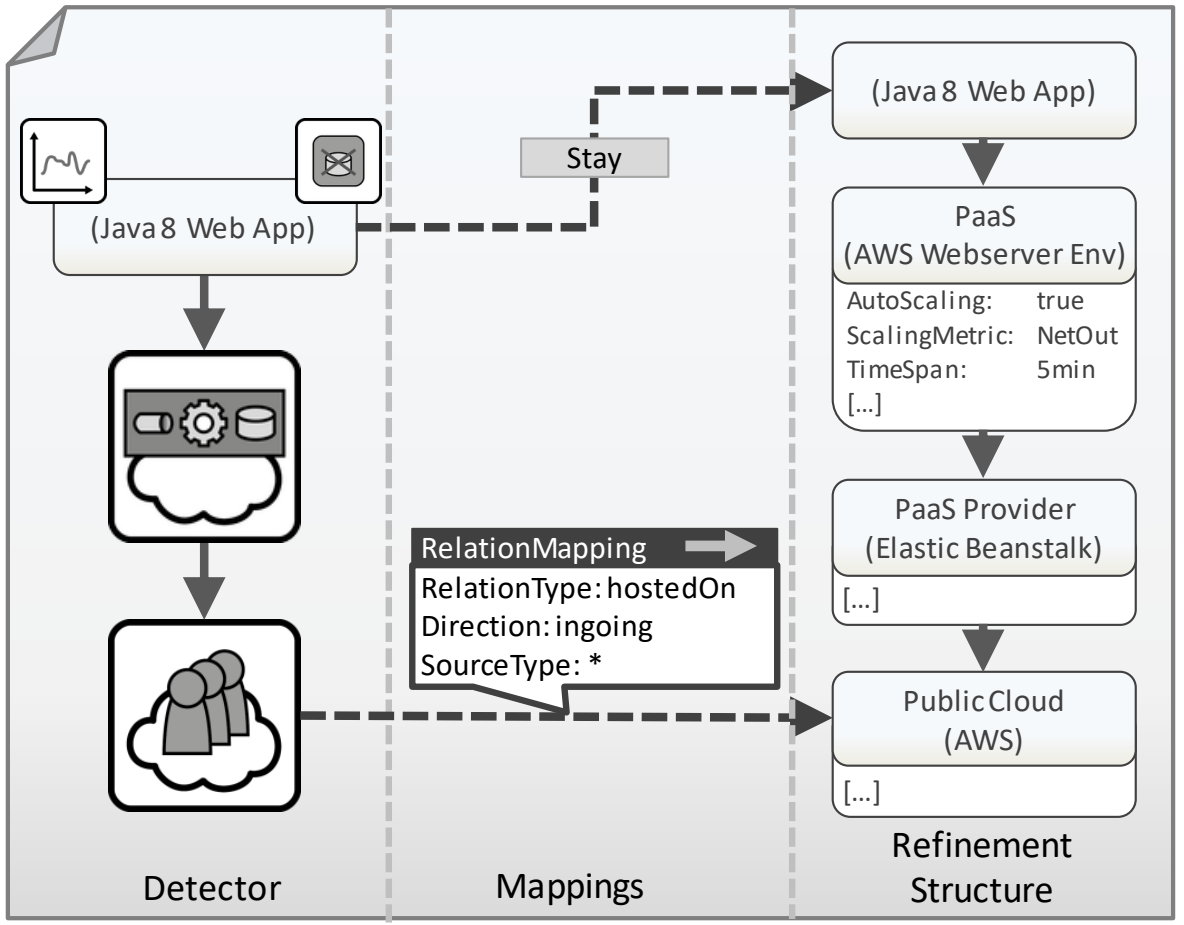

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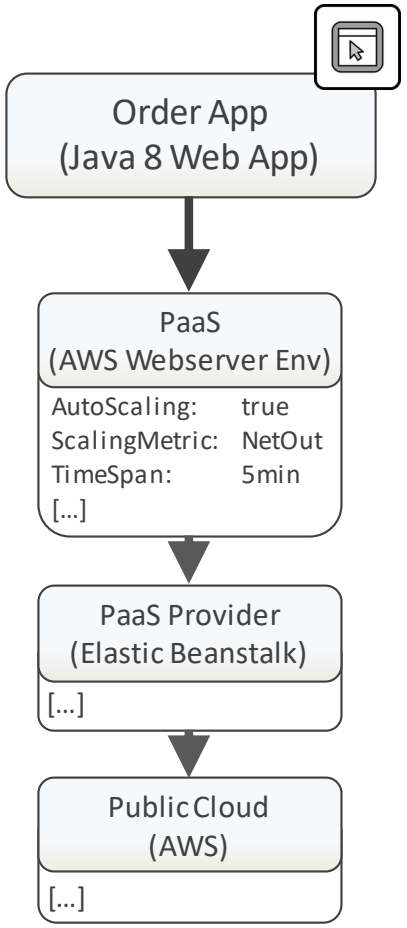

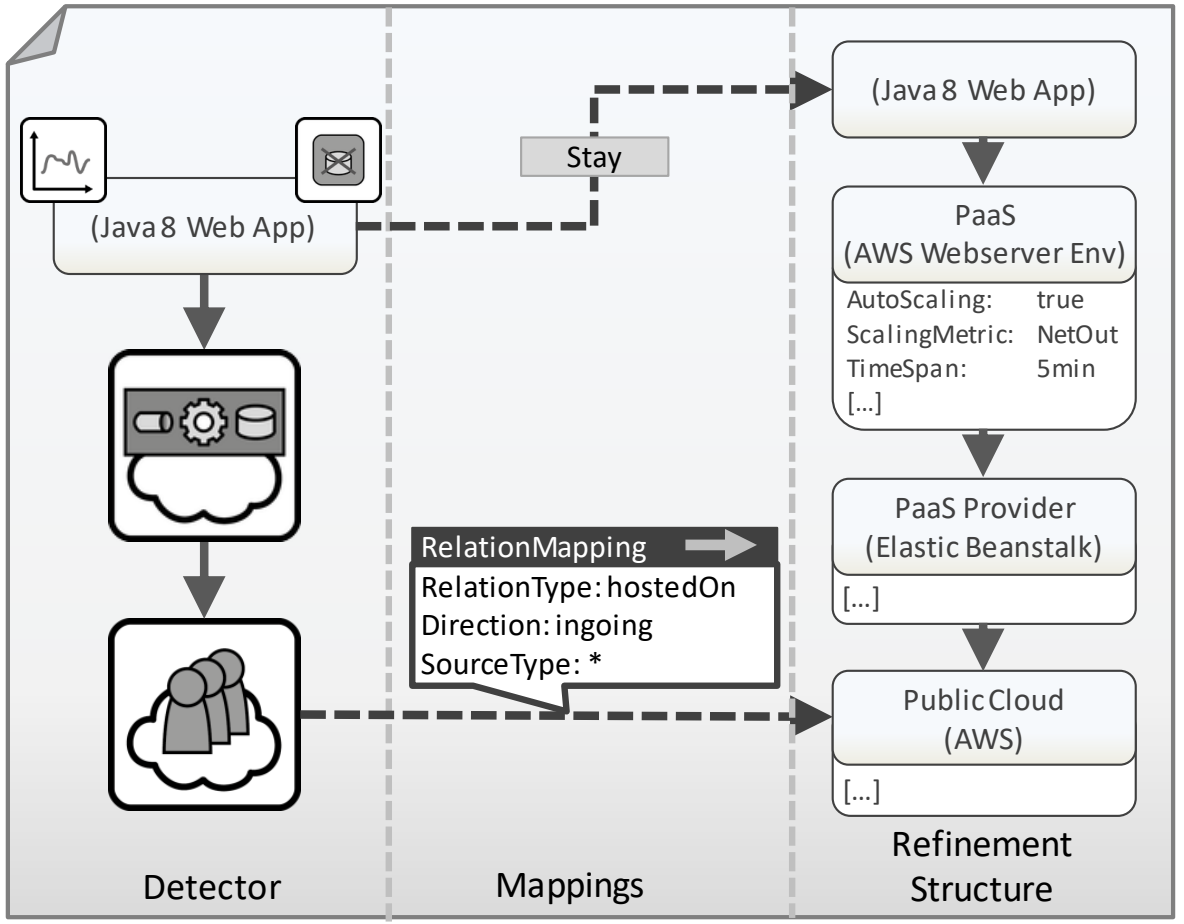

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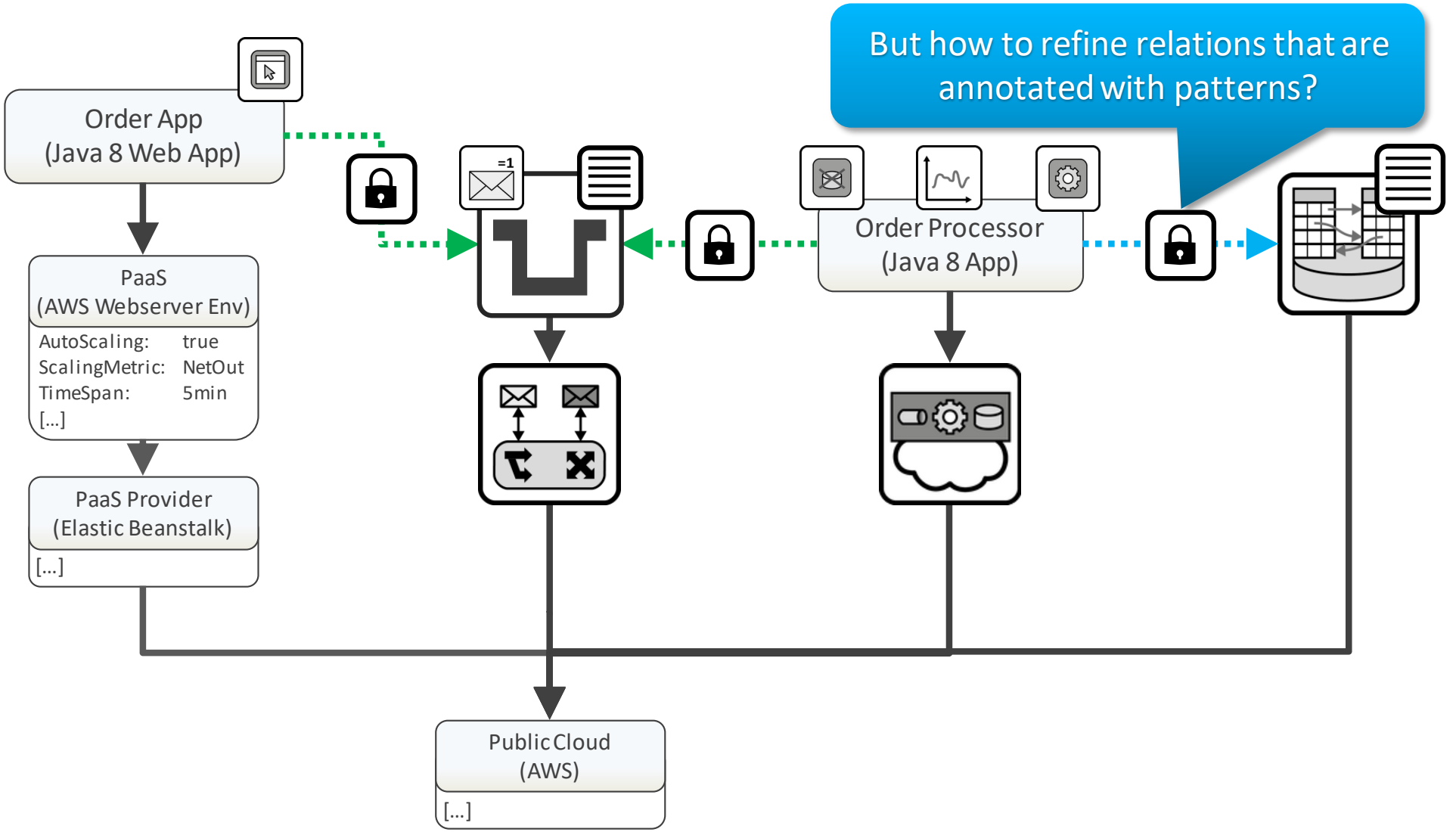
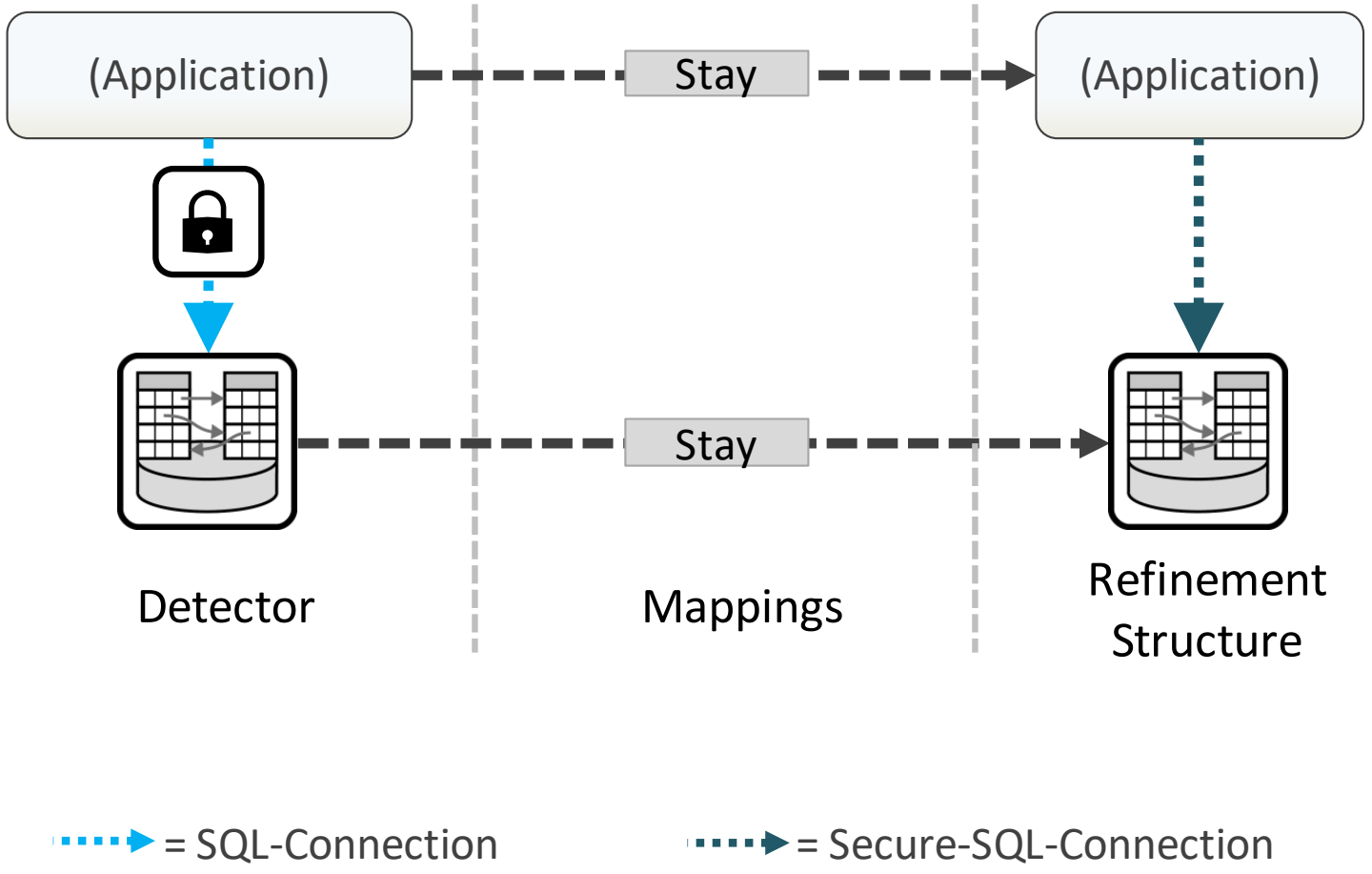


Component and Behavior Pattern Refinement Model (CBPRM)



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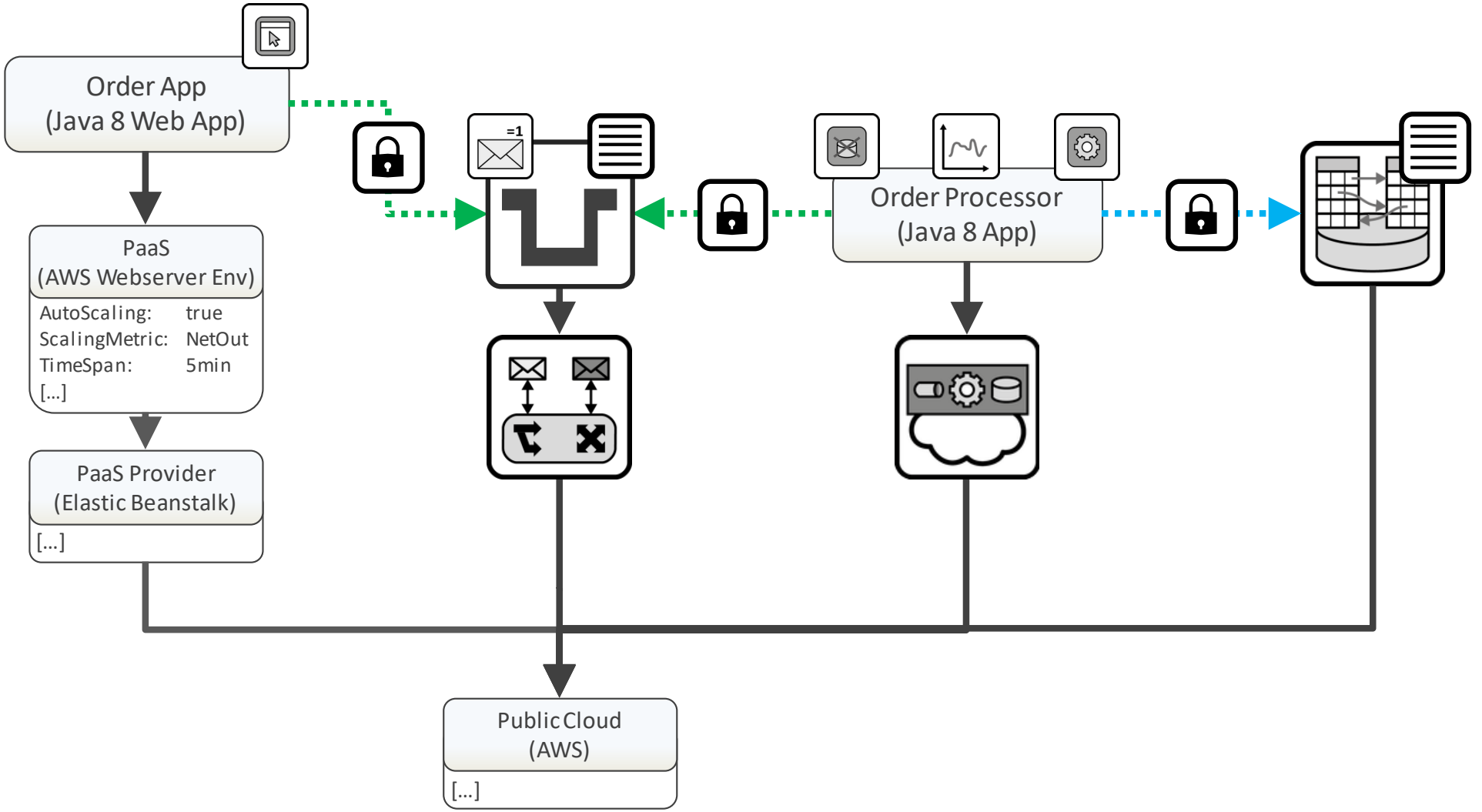

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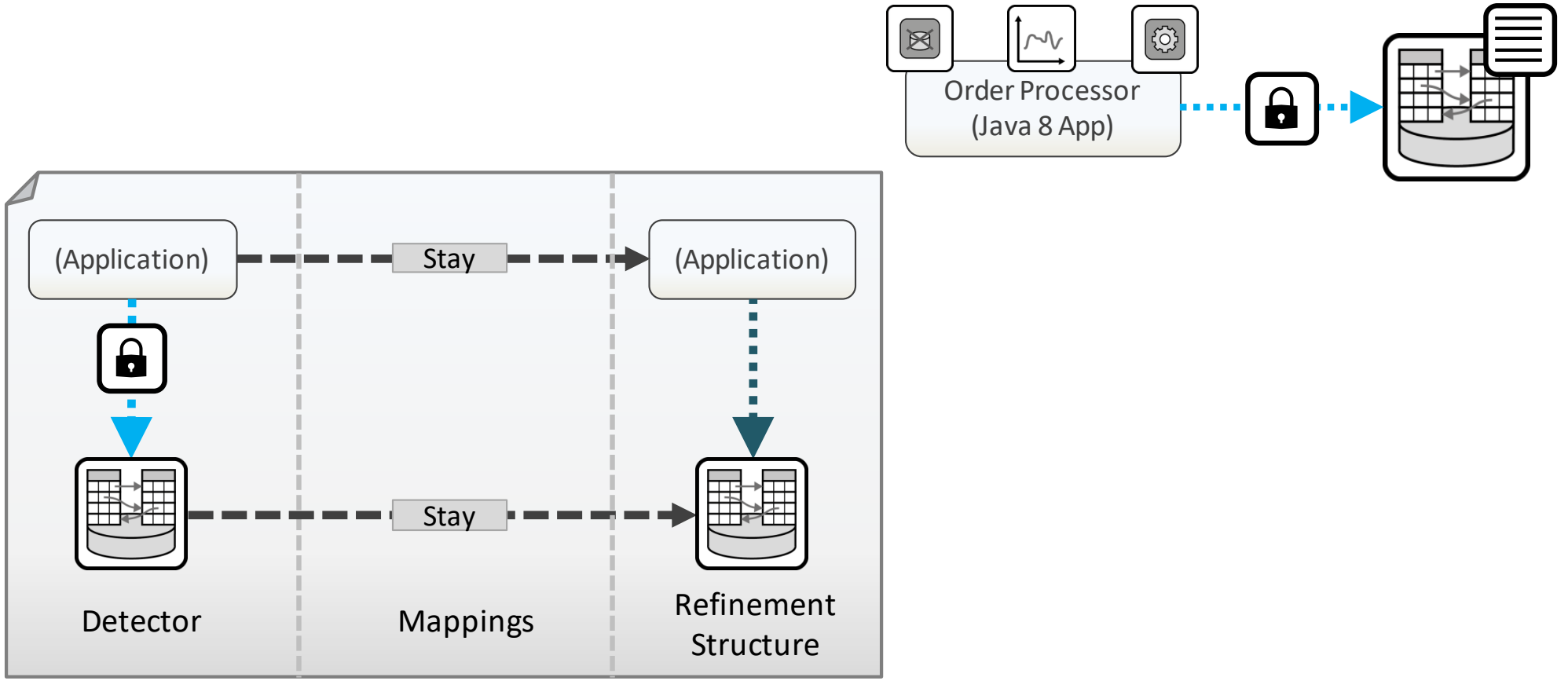

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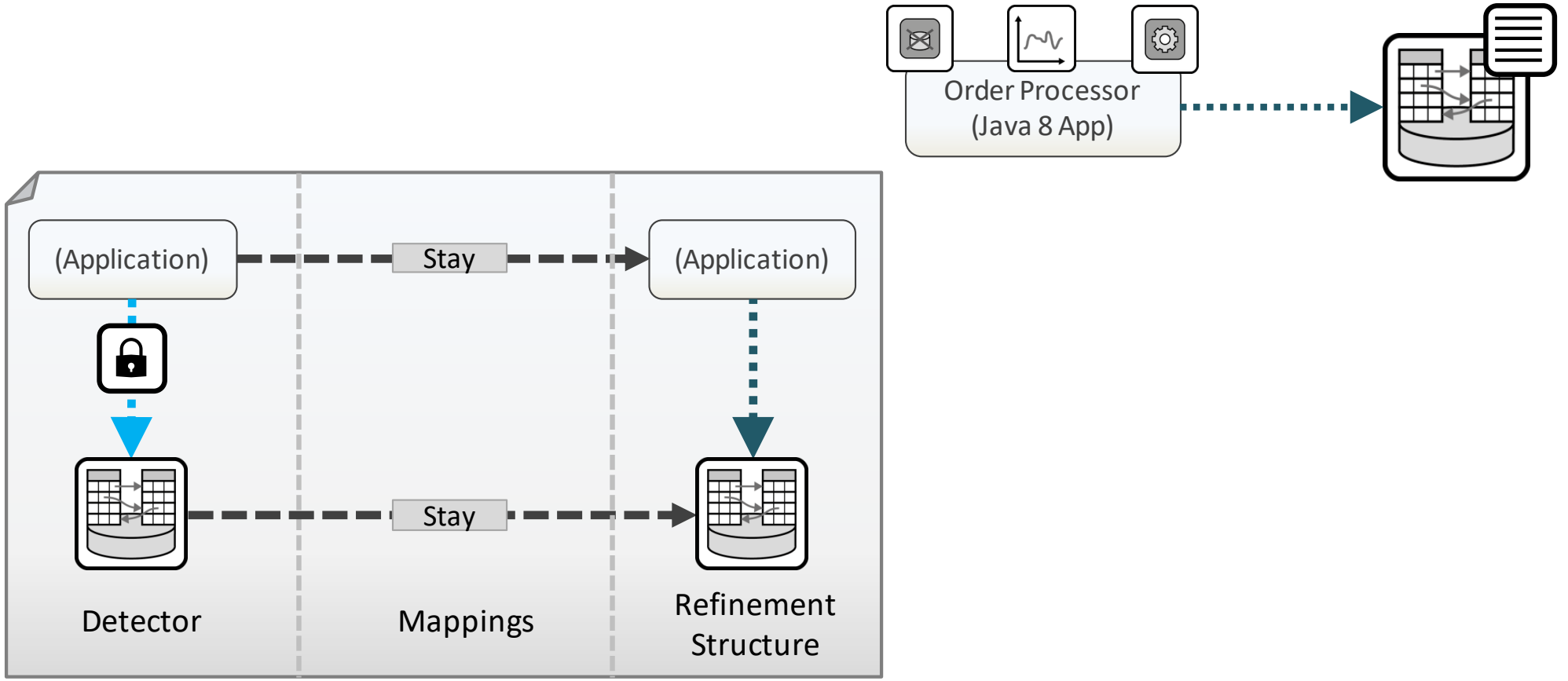

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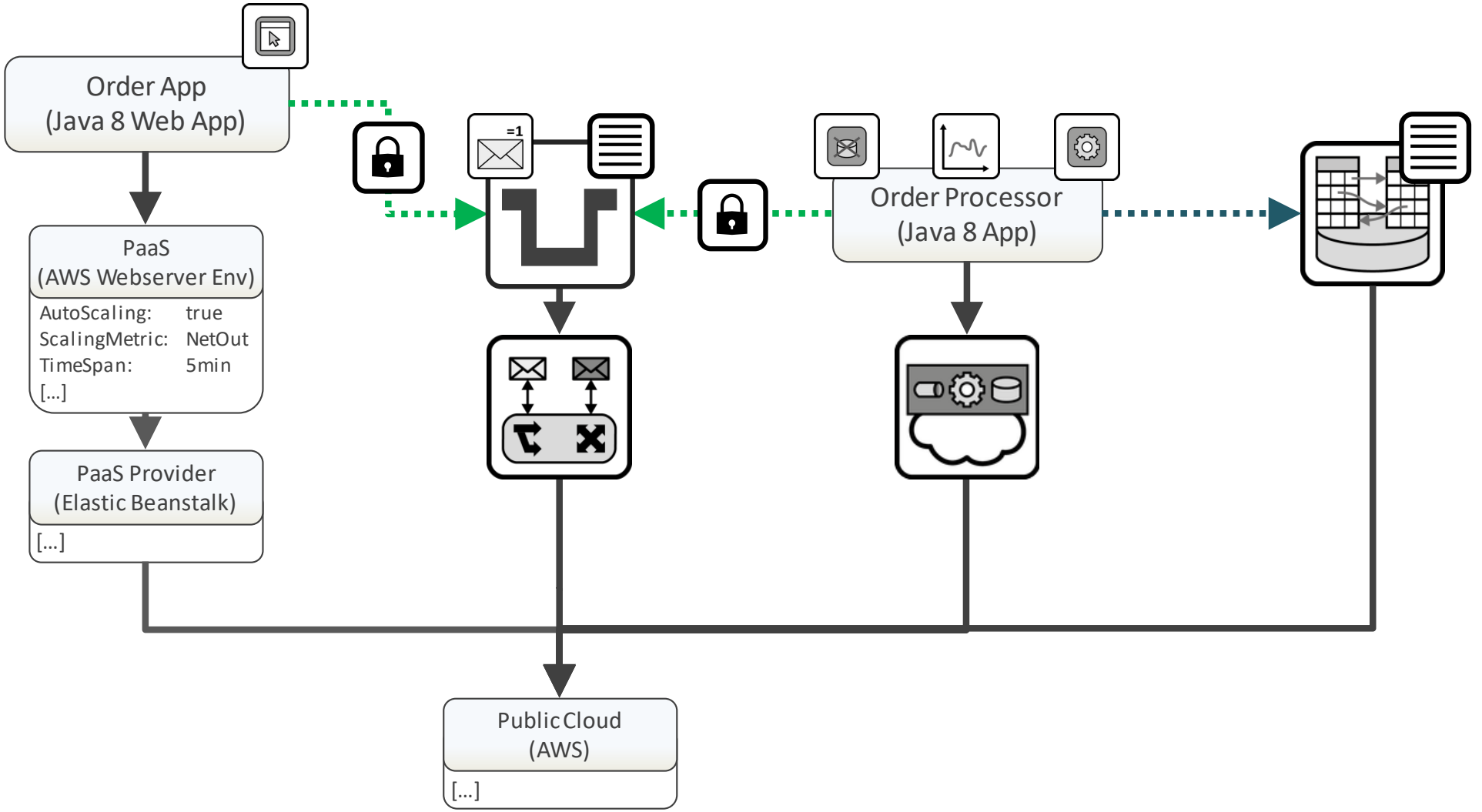
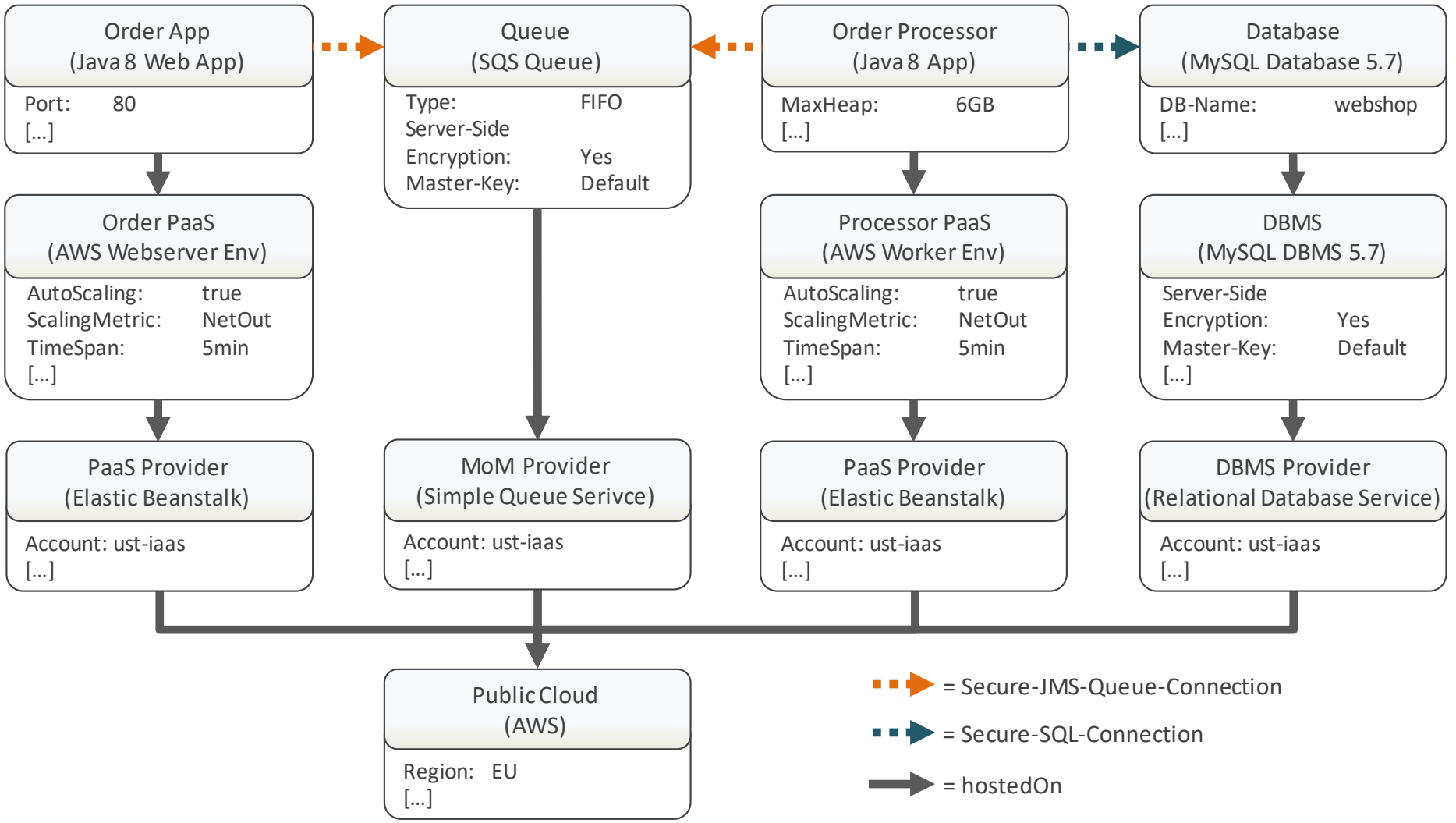


One of Many Refinement Result



Conclusion & Future Work

- Open-source implementation based on Eclipse Winery
  - Demo video available on YouTube
- Pattern-based Deployment and Configuration Models
  - Less technology-specific knowledge needed
  - Avoid vendor and technology lock-ins
- Component and Behavior Pattern Refinement Models
  - Rules how refinement can be done (semi-) automatically

Thank you!

☺

- Limitation: assumption that Deployment Models are correct
  - Close gap between architecture and deployment models
- Extend approach to automatically generate CBPRM permutations