



MORPHEMIC

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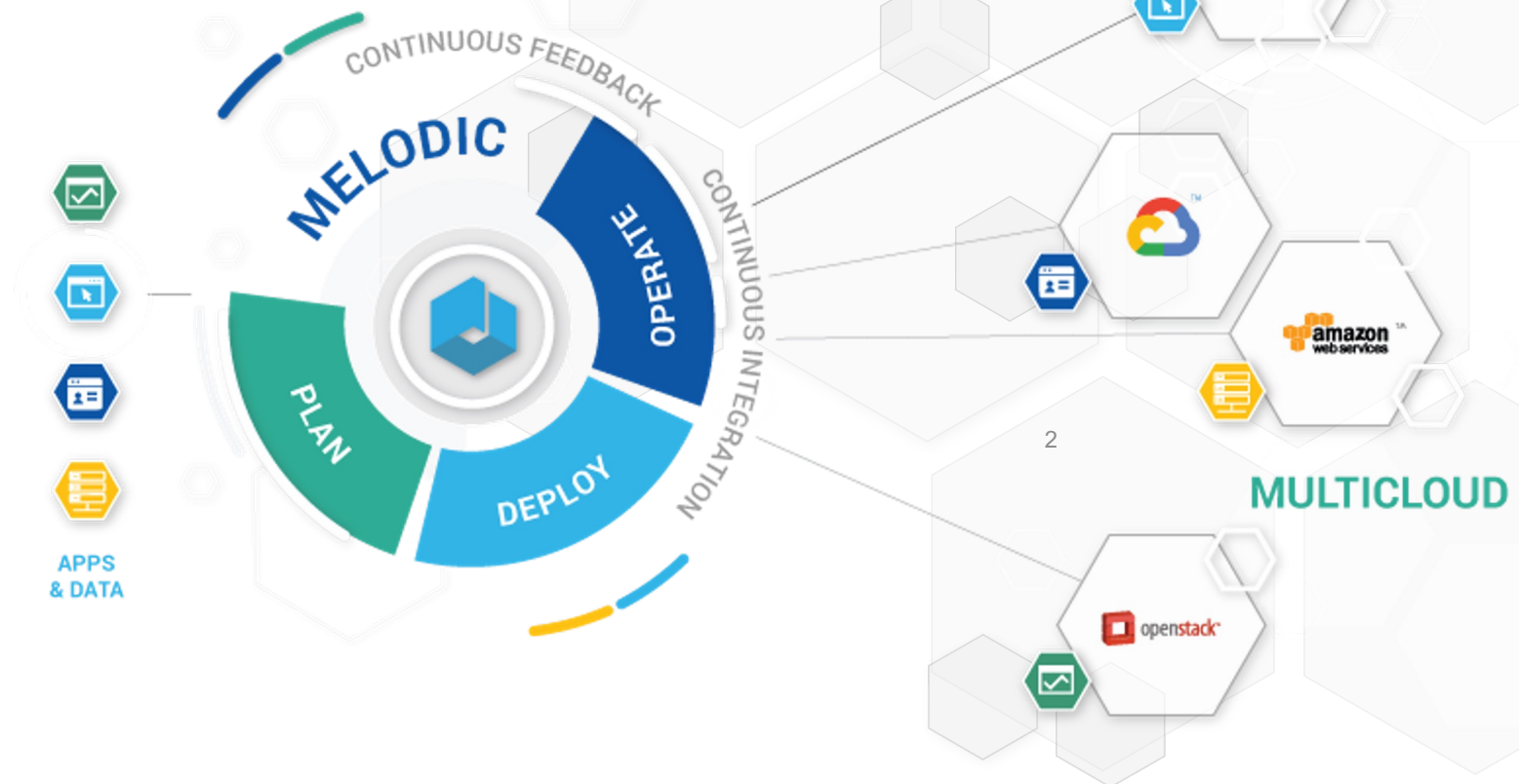
Multi-Cloud autonomous proactive
optimization and complex
monitoring of Cloud applications

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www.morphemic.cloud

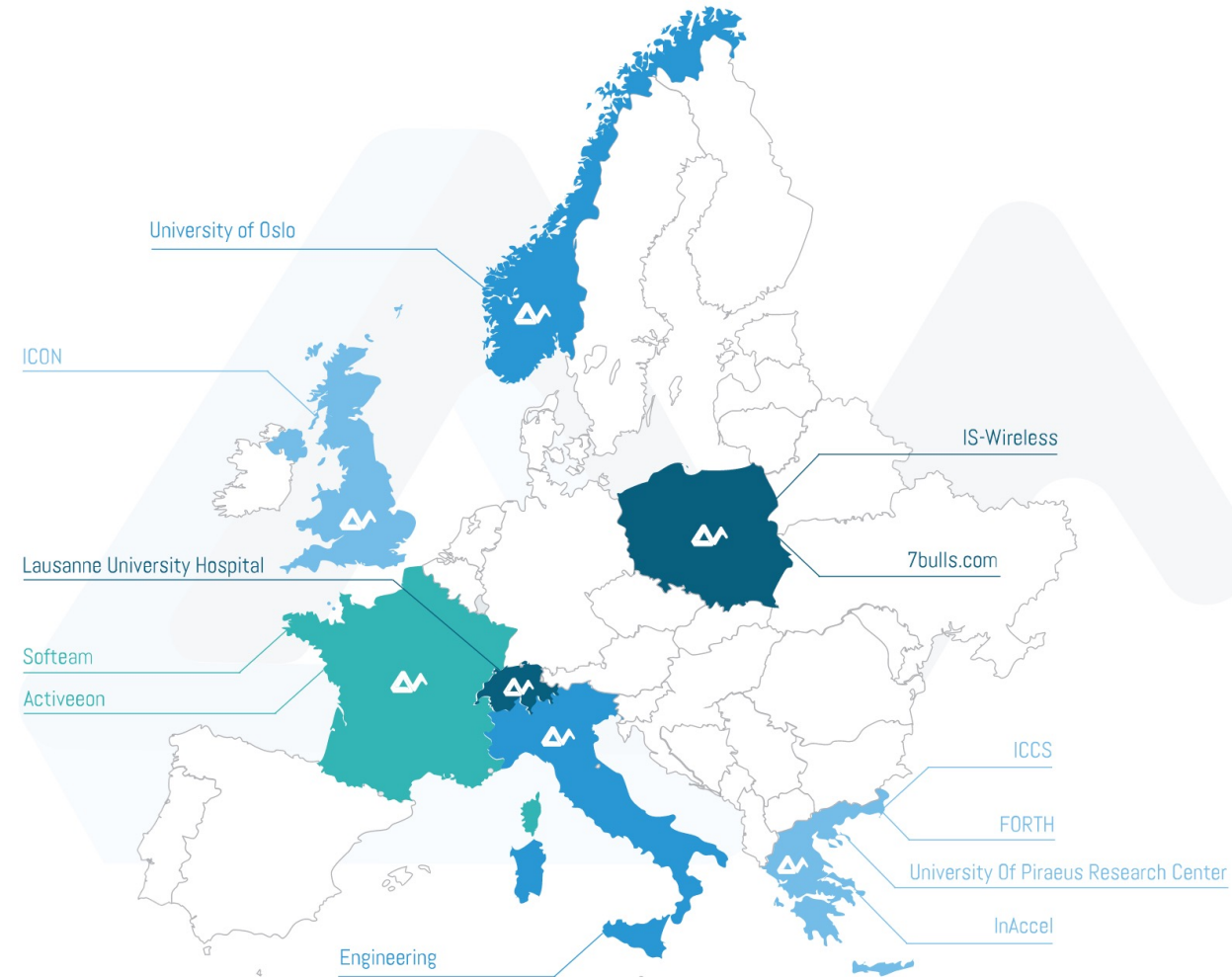
A single universal platform
for optimized deployment and management
of applications in **the cloud**.



Actually Cross-Cloud.
and Open Source

Morphemic

- Horizon 2020 project
- Started 2020
- Coordinator: University of Oslo
- Research partners: University of Oslo, University of Pireus, Foundation of Research and Technology Hellas, Institute of Communication and Computer Systems
- Industry partners: 7bulls.com, Softeam, InAccel, Engineering, Activeeon
- Use case partners: IS-Wireless, Lausanne University Hospital, ICON
- Core blocks: MELODIC, Proactive Scheduler



Melodic
optimized multicloud

ProActive
Workflows & Scheduling




MorpheMIC

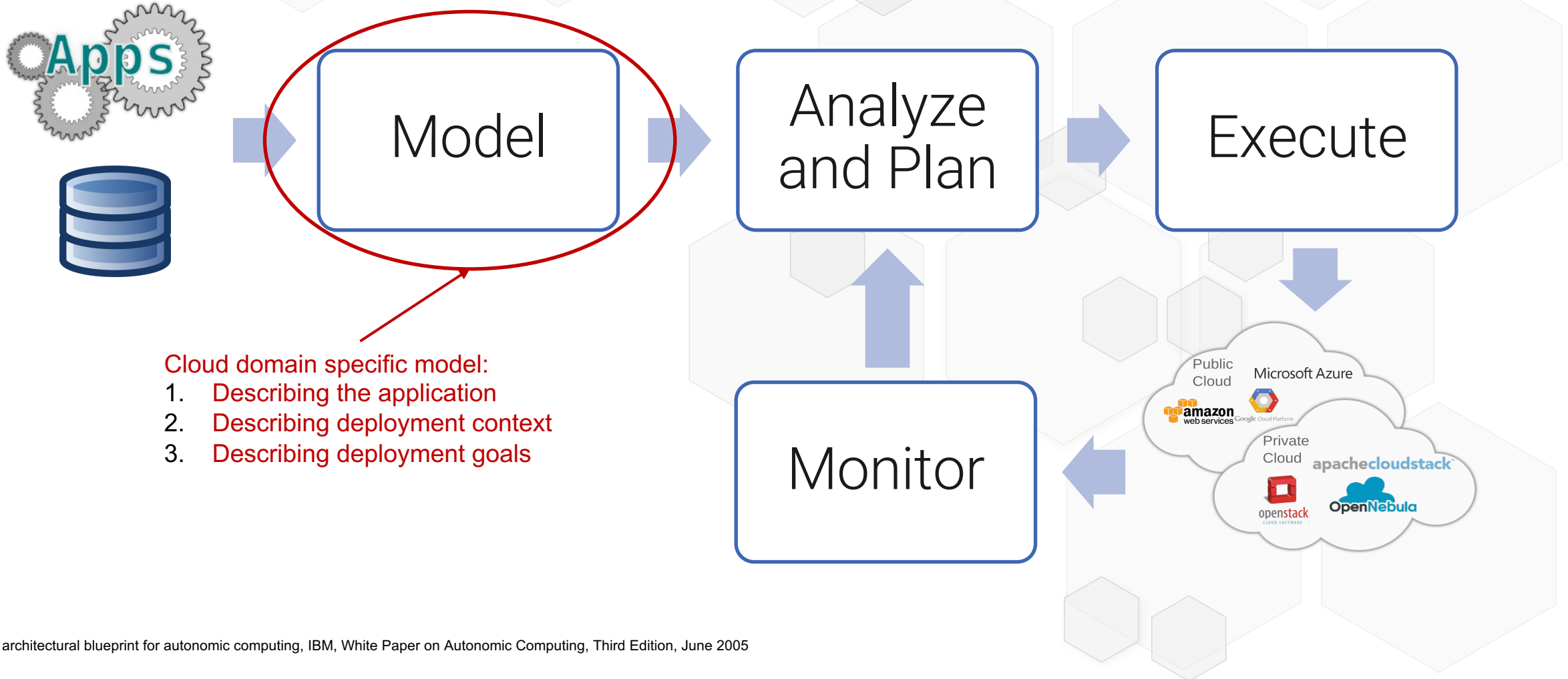
- Simple and **easy way to use Cross-Cloud**
- Unified way to deploy and manage
 - Virtual Machines, containers, Serverless, FPGA, and edge nodes to different Cloud Providers – at the same time!
- **Autonomic deployment and management**
- **Utility-based optimization** of cloud resources
- Proactive and polymorphic adaptation

Polymorphic and proactive adaptation

- Polymorphic: Maximize the utility of the application by adapting the technical forms (VMs/containers/FPGA etc) of its components
- Proactive: Forecast execution context to anticipate deployment to predict resources needs
- Deployment anticipation
 - Conduct effective adaptation of the application
 - Provide seamless experience for end-user



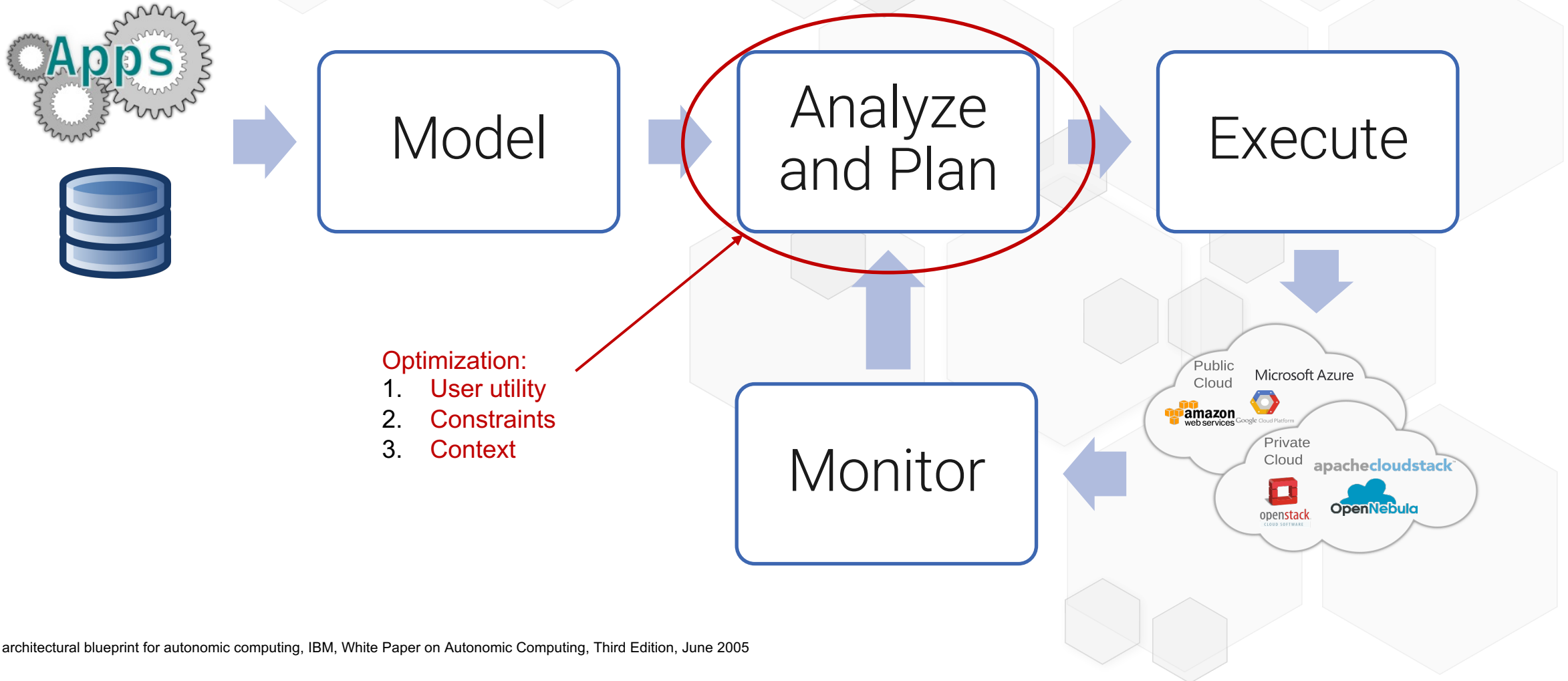
MORPHEMIC – multcloud optimization



An architectural blueprint for autonomic computing, IBM, White Paper on Autonomic Computing, Third Edition, June 2005



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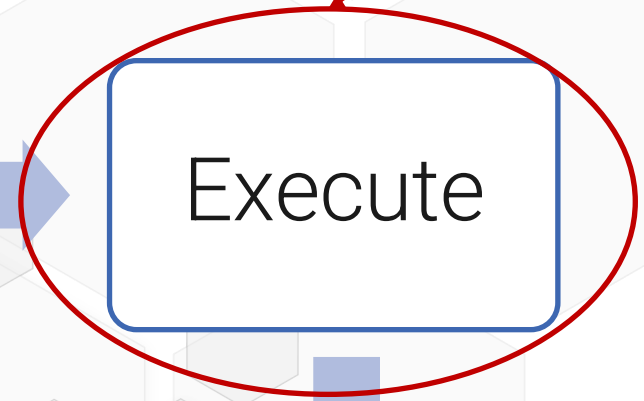
MORPHEMIC – multcloud optimization



Model

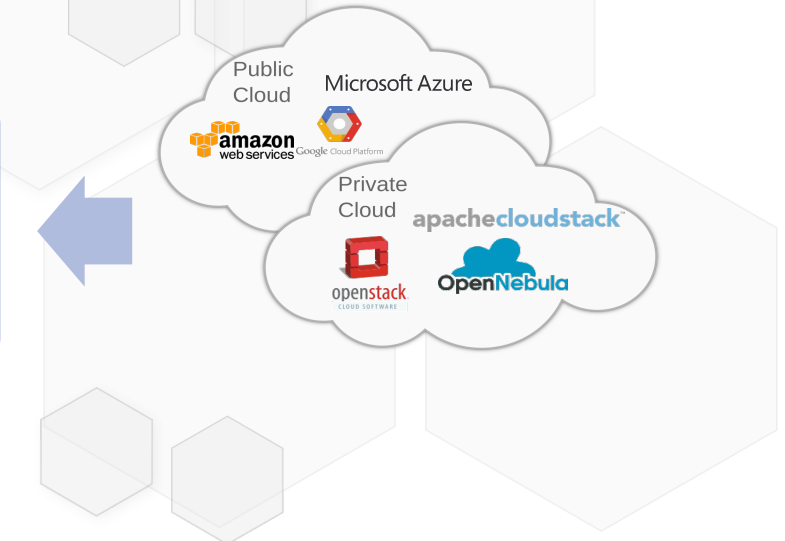


Analyze
and Plan



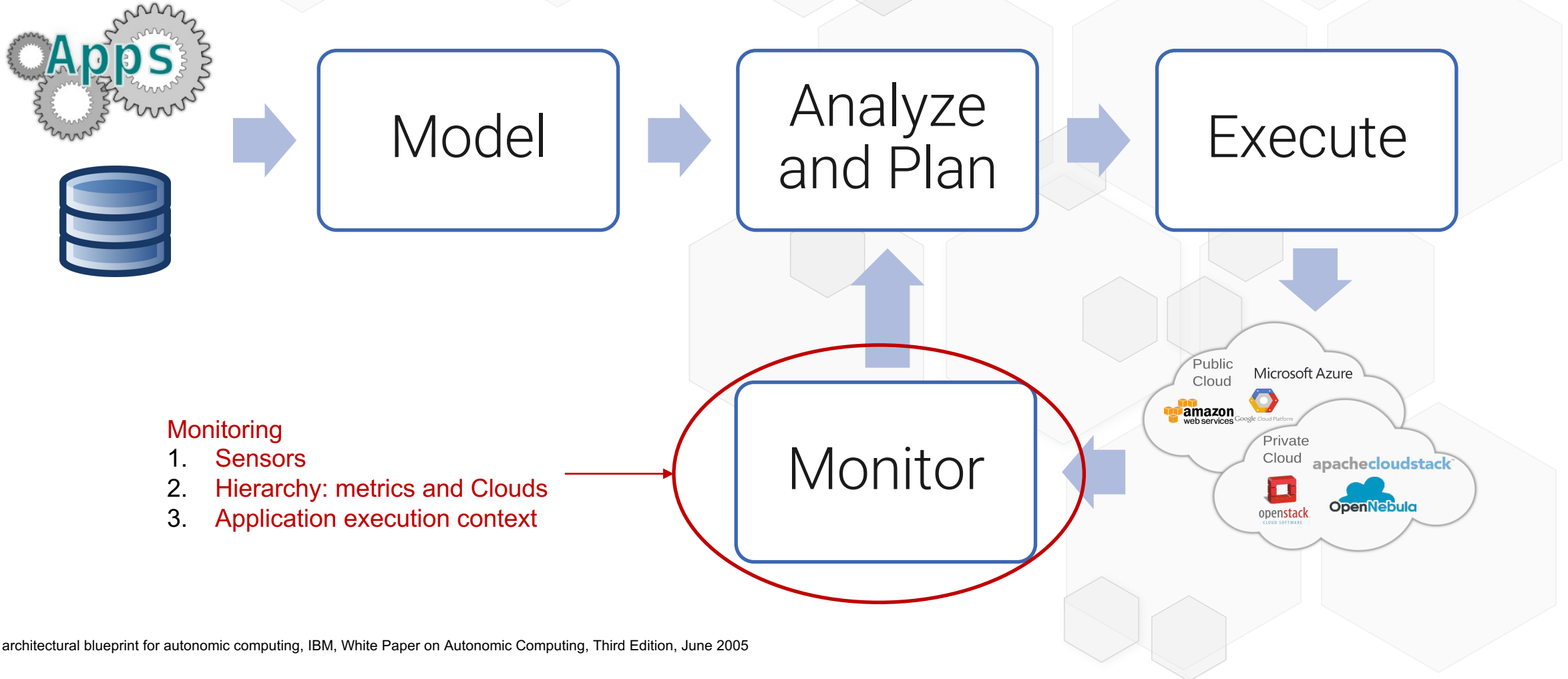
- Adaptation & deployment
1. Adaptation step planning
 2. Action scheduling
 3. Cloud provider interactions

Monitor



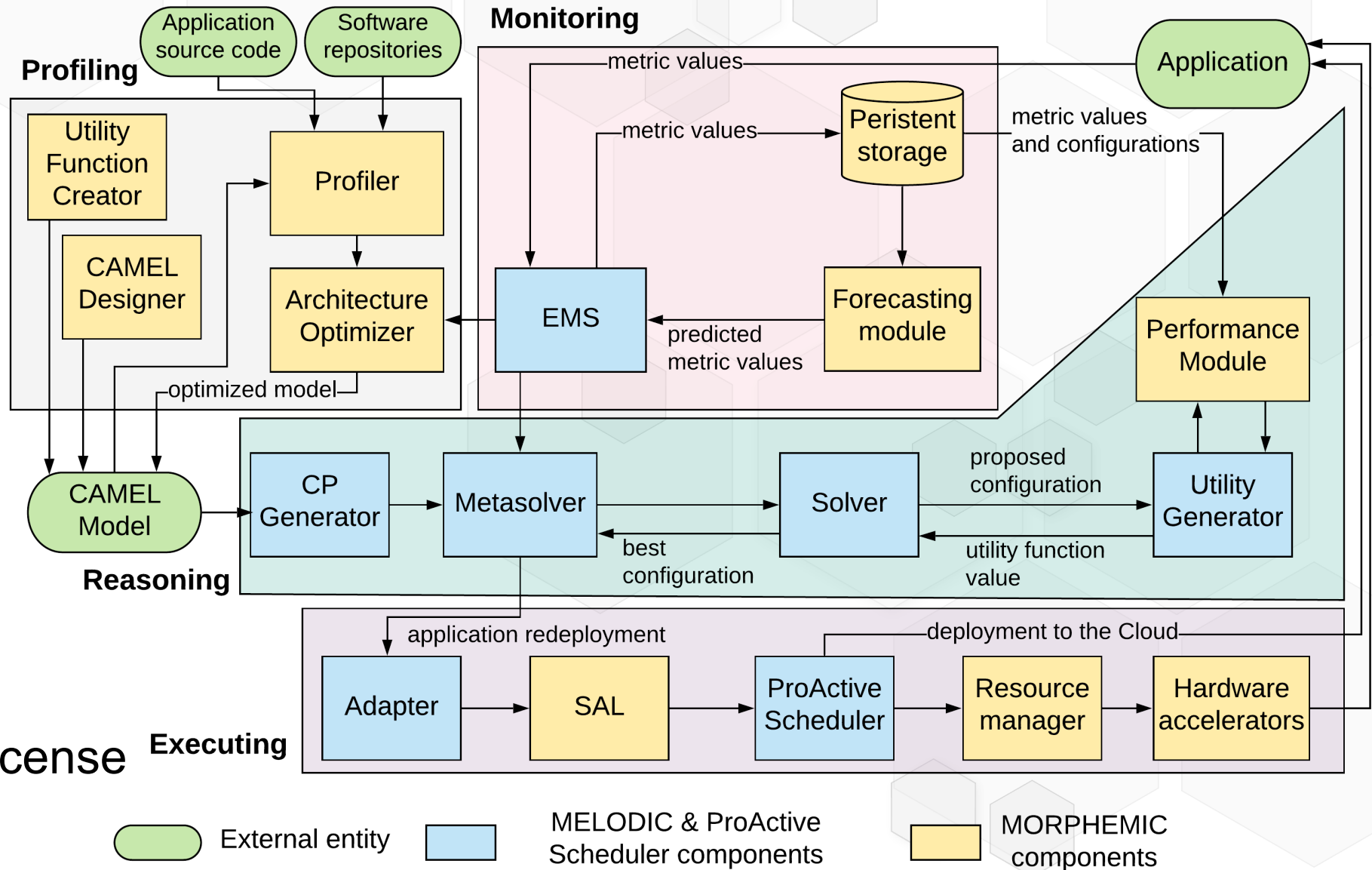


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An architectural blueprint for autonomic computing, IBM, White Paper on Autonomic Computing, Third Edition, June 2005

MORPHEMIC Open source components usage



Licenses:

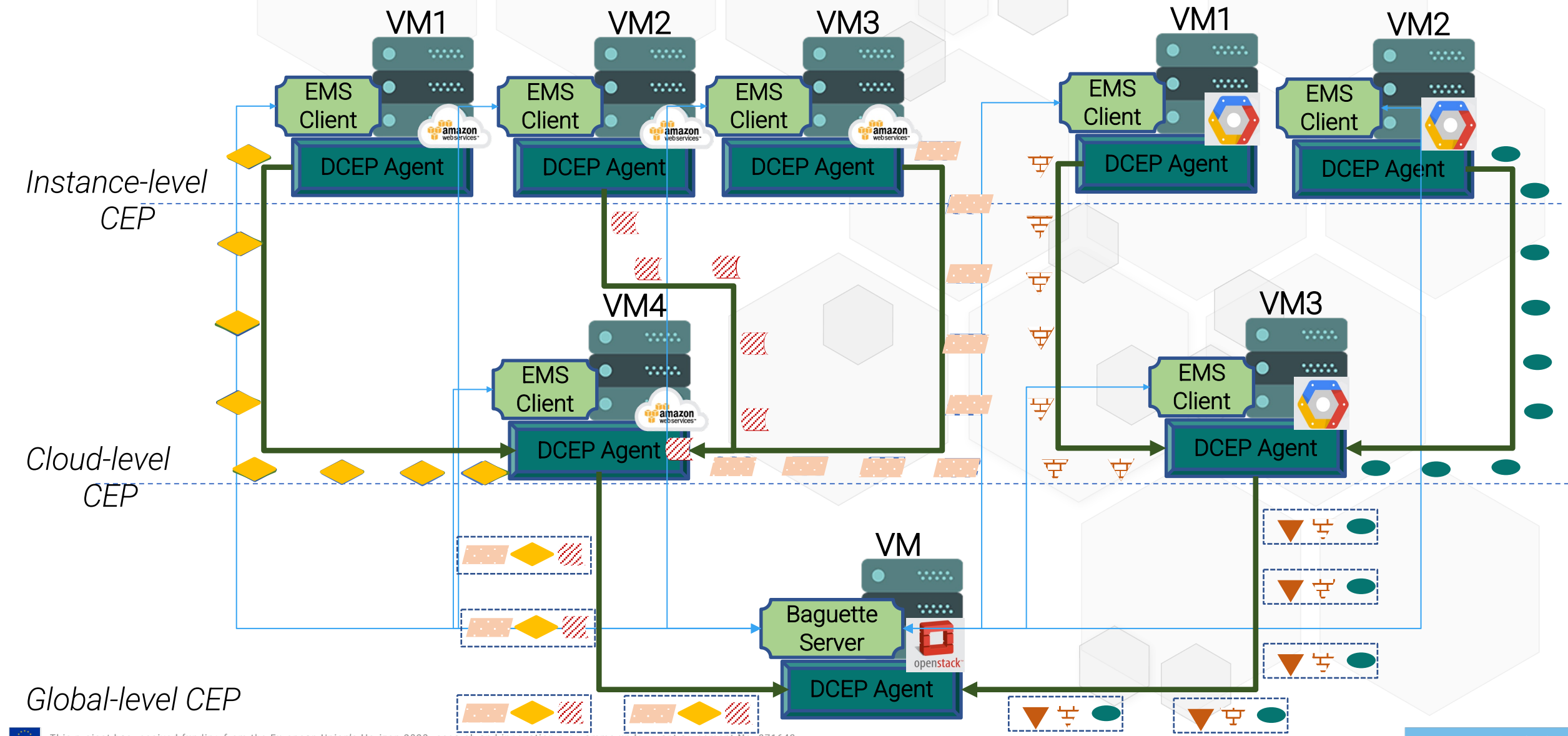
MPL

Apache Public License

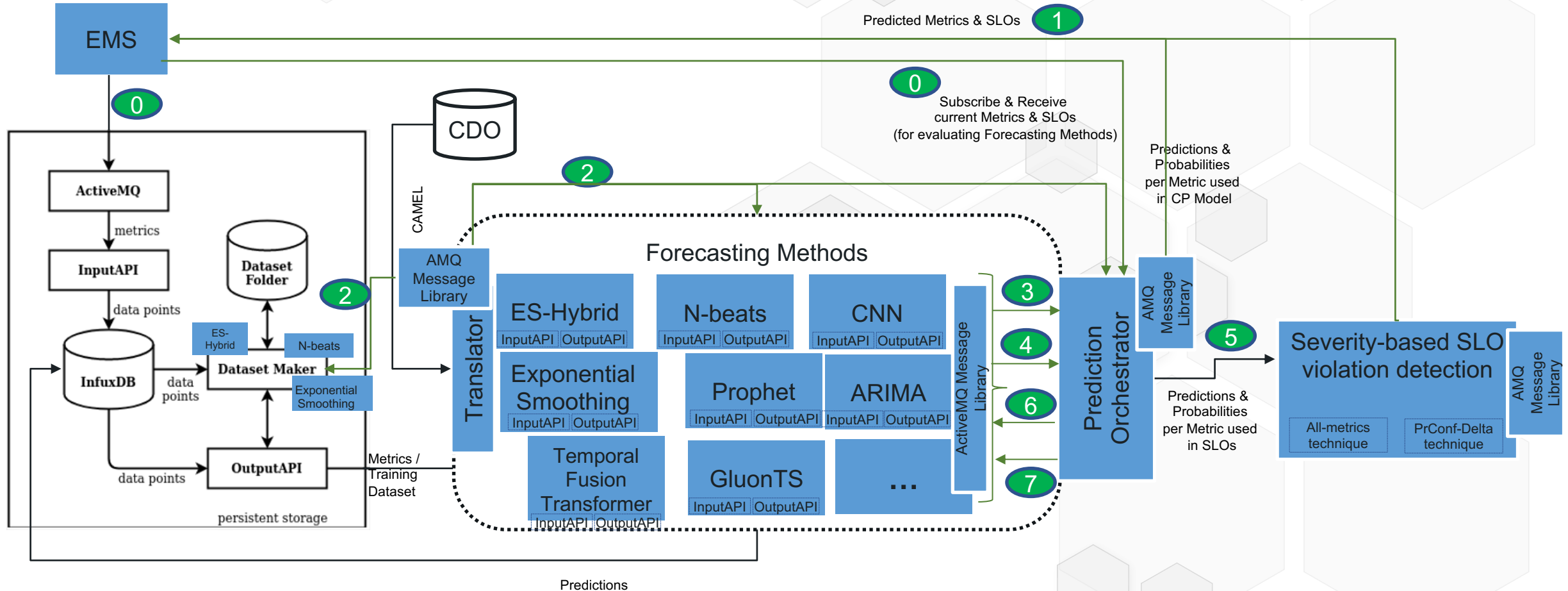
Executing

Event Management System (EMS)

Bird's Eye View



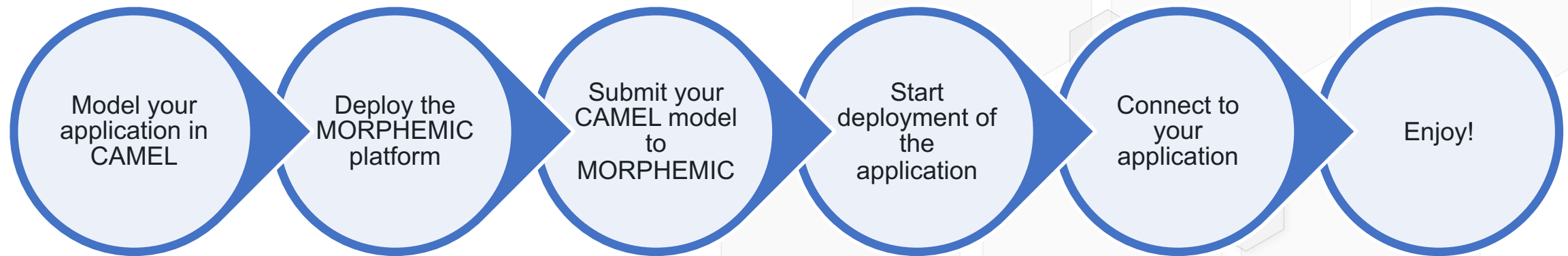
Forecasting module



Reasoning

- Stateless solvers
 - Monte Carlo Tree Search
 - Genetic Algorithms
 - Parallel Tempering
 - Exhaustive search
- Stateful solvers:
 - Reinforcement Learning Solver for Polymorphic adaptation and grouping of components
 - Proactive Supervised Learning Solver (Cloud2Things workshop)
 - Reinforcement Learning Offline Q-learning solver
- Performance estimation & Utility calculations
- <https://www.morphemic.cloud/publications/>

Work flow



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MORPHEMIC



www.morphemic.cloud



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www.linkedin.com/showcase/morphemic-project



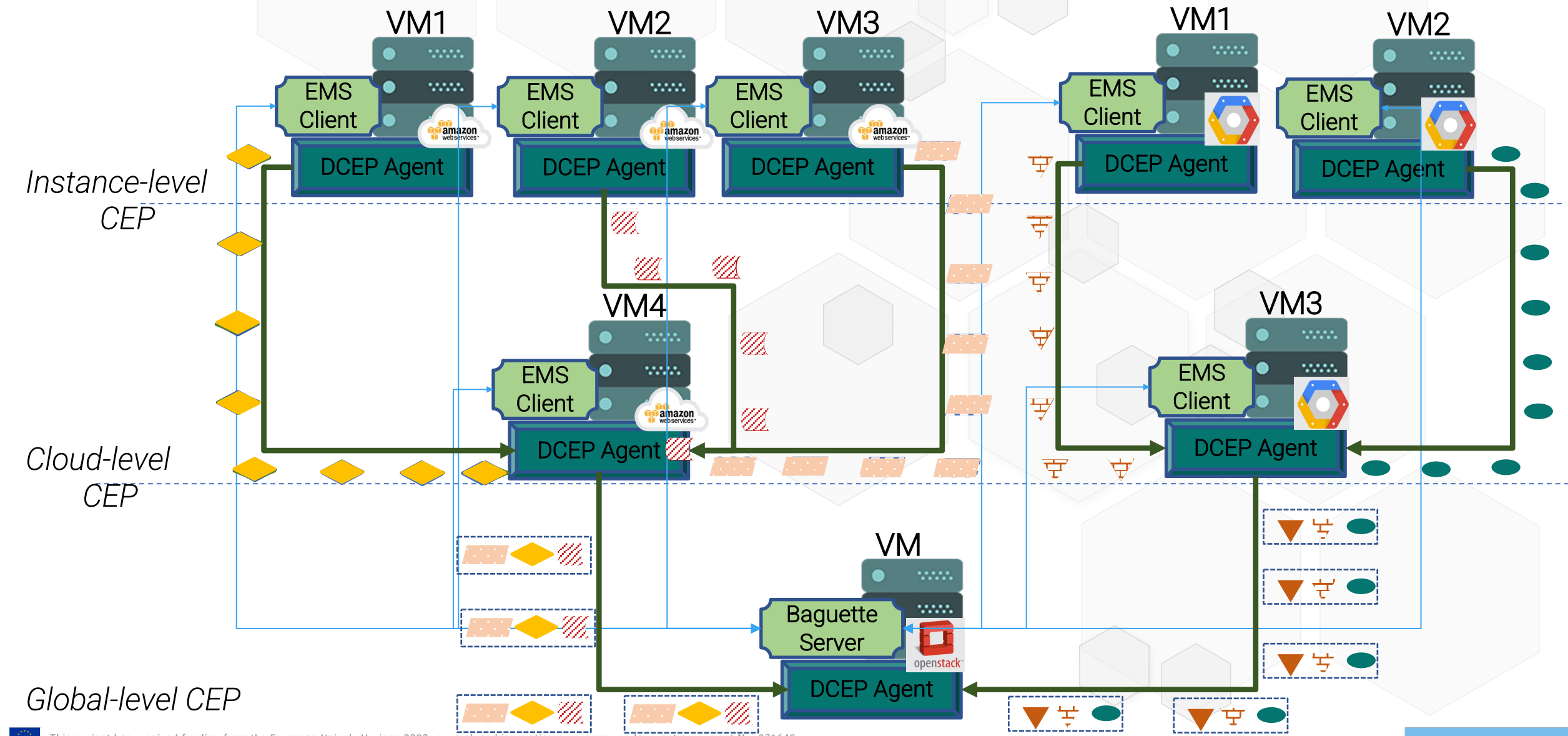
twitter.com/_morphemic_

Thank you!

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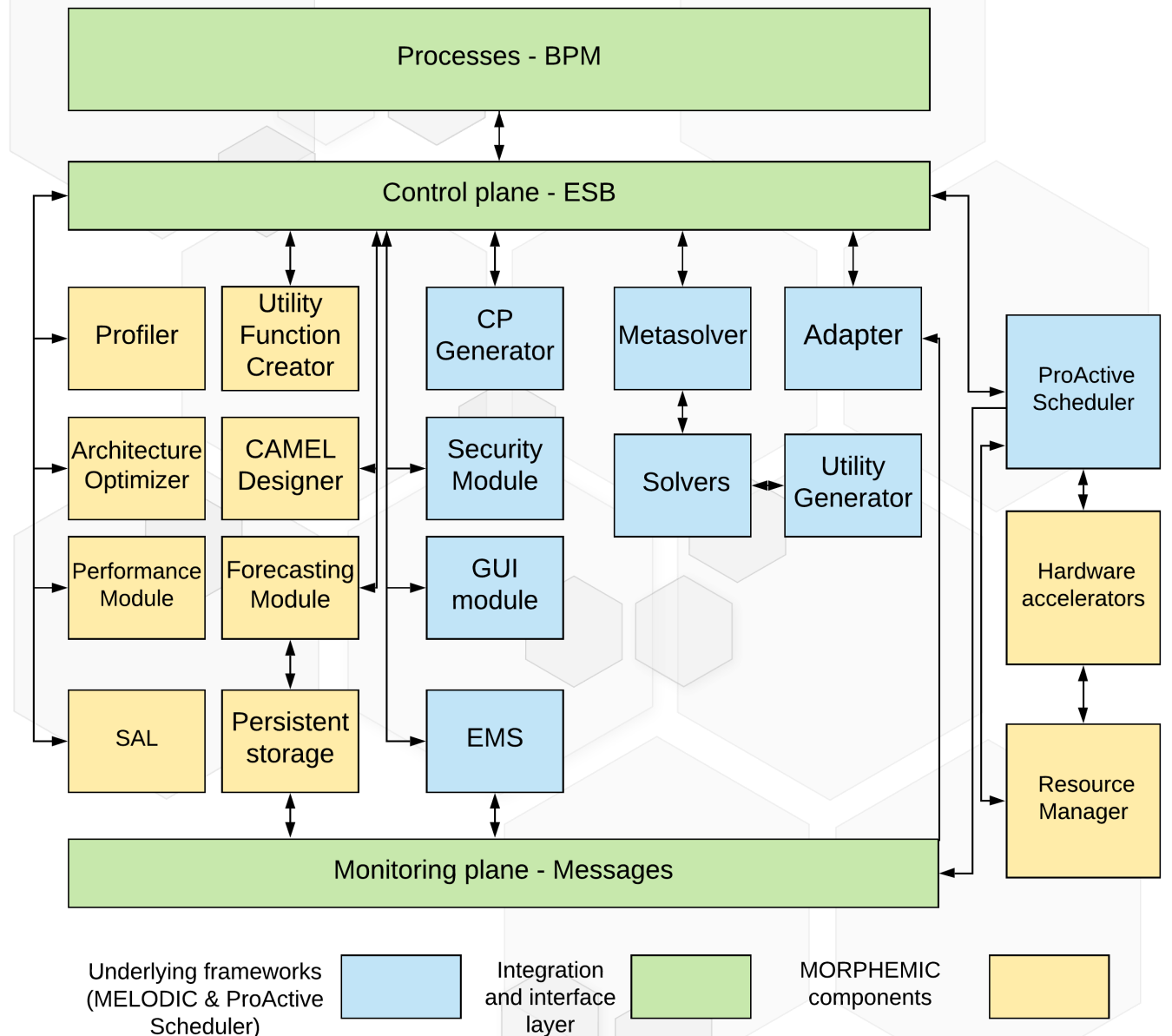
Event Management System (EMS)

Bird's Eye View



MORPHEMIC architecture using open source components

- microservices
- Enterprise Service Bus (ESB)
- Business Process Management (BPM)



Overview of MORPHEMIC Open source strategy

- All components of MORPHEMIC platform are available open sources.
- License depends on components, but all source codes are available.
- Licenses:
 - MPL
 - Apache Public License

MORPHEMIC Core Building Blocks



H2020 Melodic

- European Research Project
- 2017-2019
- Provider of cloud deployment, monitoring, and context adaptation capabilities
- Url: <https://melodic.cloud/>



ProActive Workflow Scheduler

- Incubated OW2 project, commercialized by Activeeon
- Integrated in 2009
- Provider of runtime scheduling in multi-cloud and edge environments
- Url: <https://www.activeeon.com/>