



ORLEANS: CLOUD PROGRAMMING FOR EVERYONE

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CLOUD COMPUTING = CLIENTS + CLOUD

- Next computing platform
 - Functionality split between client and cloud
 - Multiplicity of devices
 - “Unlimited” compute and storage on demand in cloud
- Augmentation not substitution
 - Smartphone + tablet + PC
 - Many devices, some specialized
- Buy services, not bits

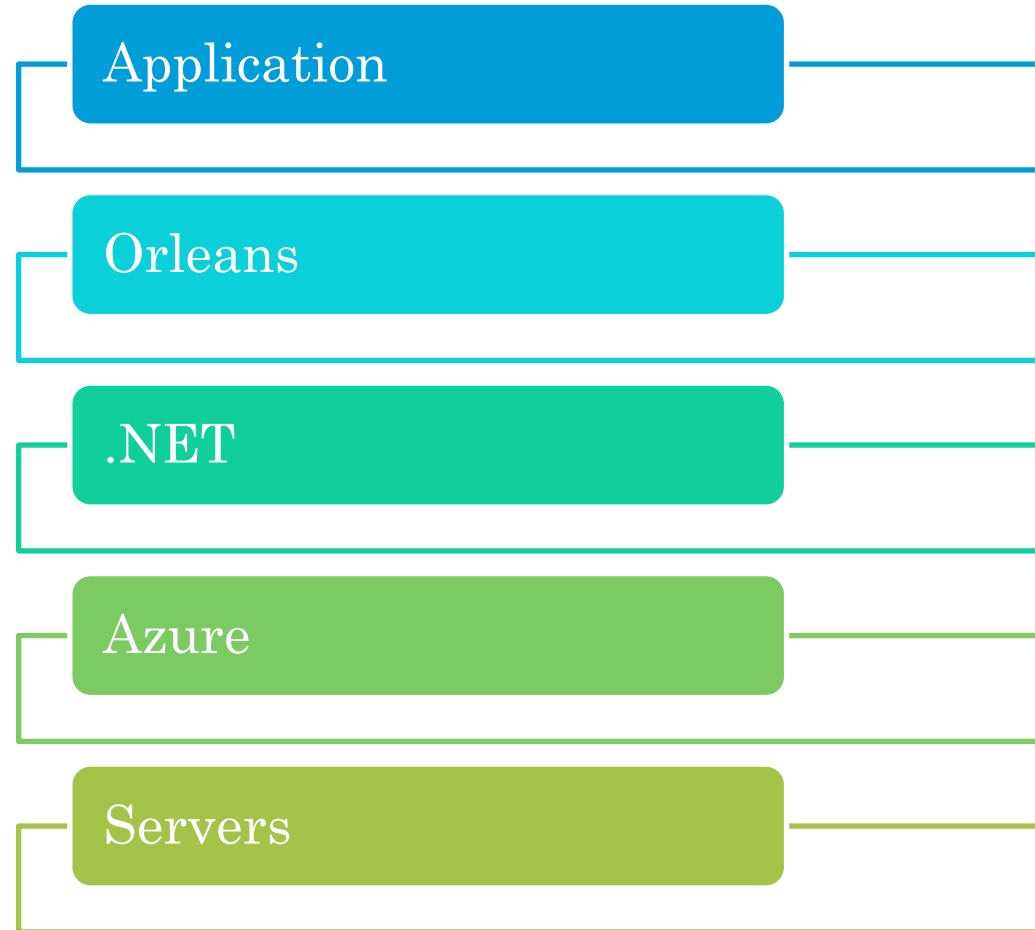


CHALLENGES OF CLOUD COMPUTING

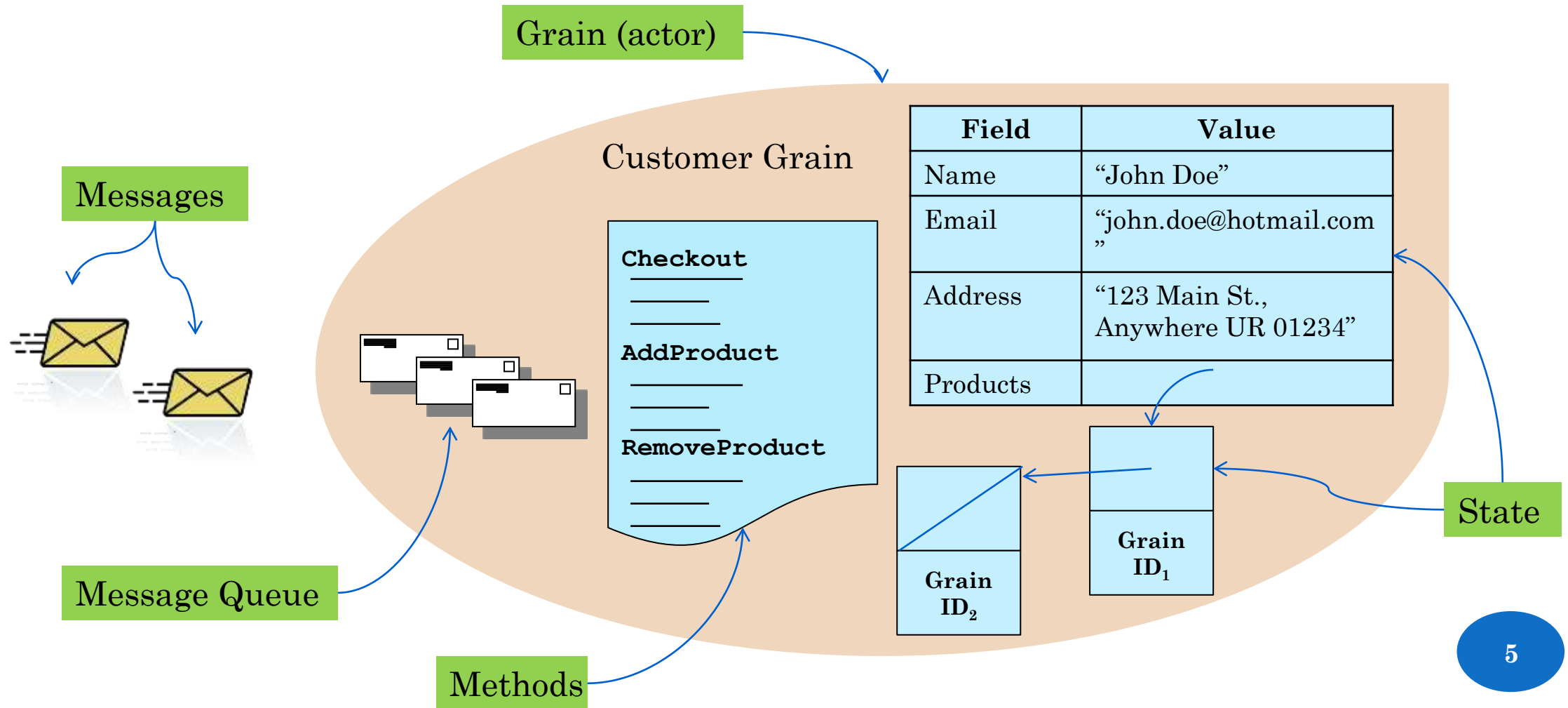
- Inherently parallel and distributed
 - Many servers, possibly in multiple data centers
 - Diverse clients with disparate capabilities
- Unreliable, failure-prone platform
 - Commodity computers and communication links
 - Non-negligible failure rates with complex failure modes
- Services, not stand-alone applications
 - Varying and unpredictable loads
 - High availability and reliability
- And, historic challenges of constructing secure, reliable, scalable, elastic, and efficient software

ORLEANS

- Software framework and runtime to make cloud programming easier and more productive
 - Experimental system from Microsoft Research
- Shift burden of correctness and performance from developer to Orleans system
- Radically simplified, prescriptive programming model



ORLEANS IS ACTOR BASED



GRAIN ACTIVATIONS

NumAvailable

Buy

AddReview

Field	Value
Name	"Canon EOS T3i"
Number	B004J3V90Y
Quantity	12345
Price	\$800.0
Reviews	

Grain ID₂

Grain ID₁

NumAvailable

Buy

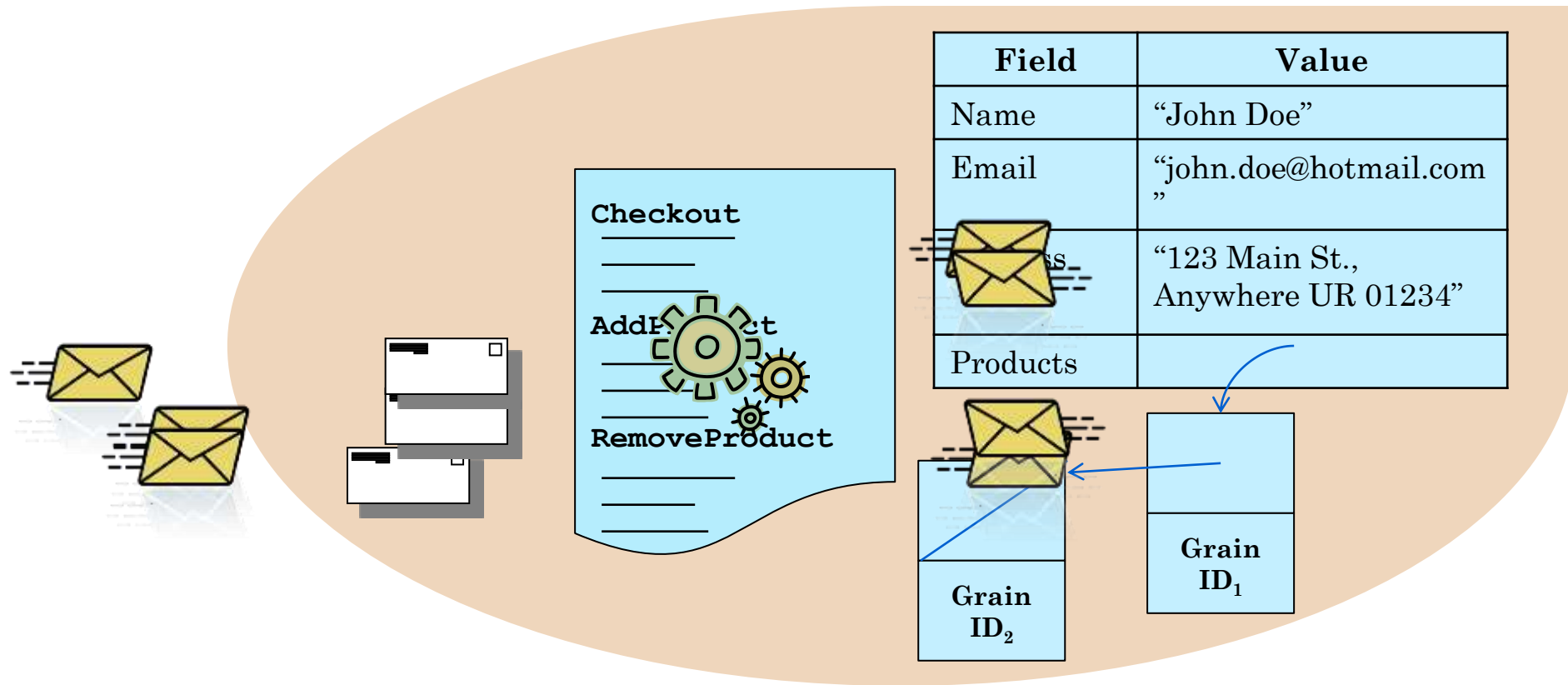
AddReview

Field	Value
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Grain ID₂

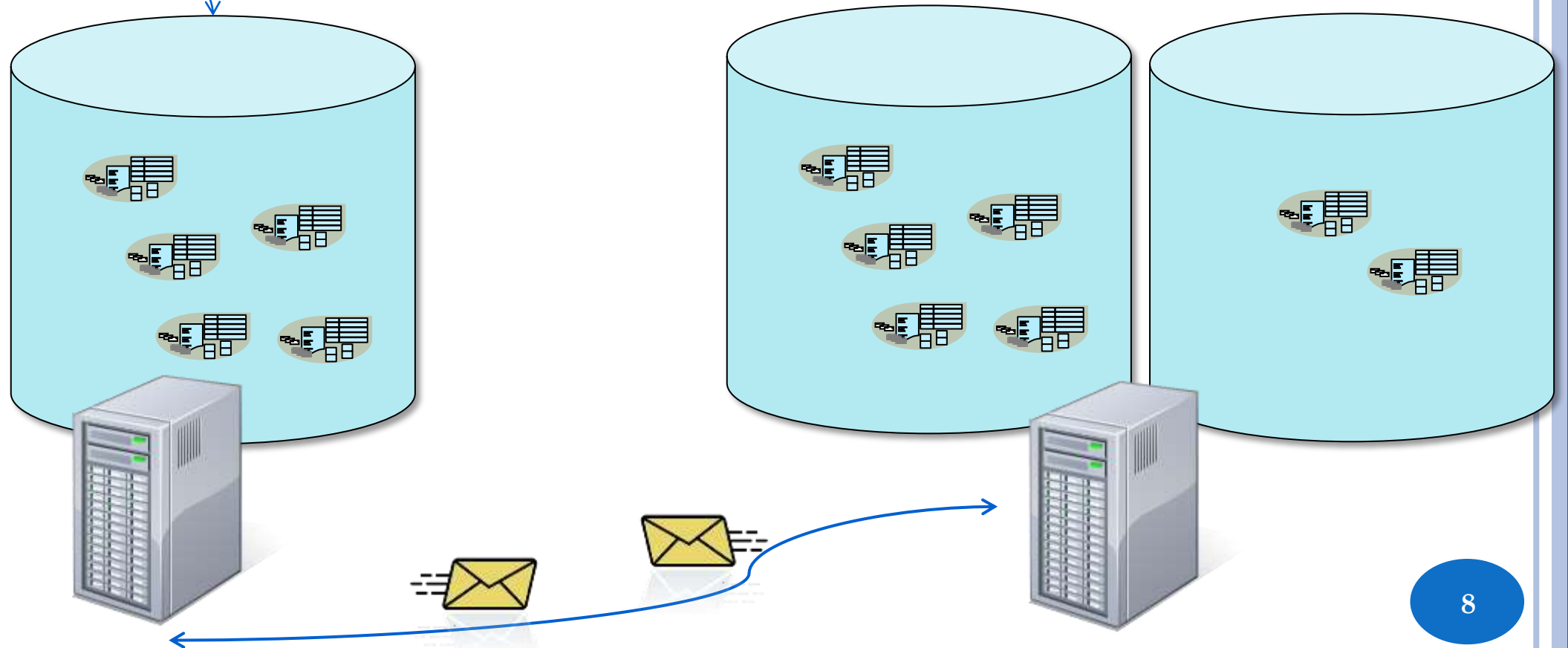
Grain ID₁

IN-GRAIN PROGRAMMING MODEL

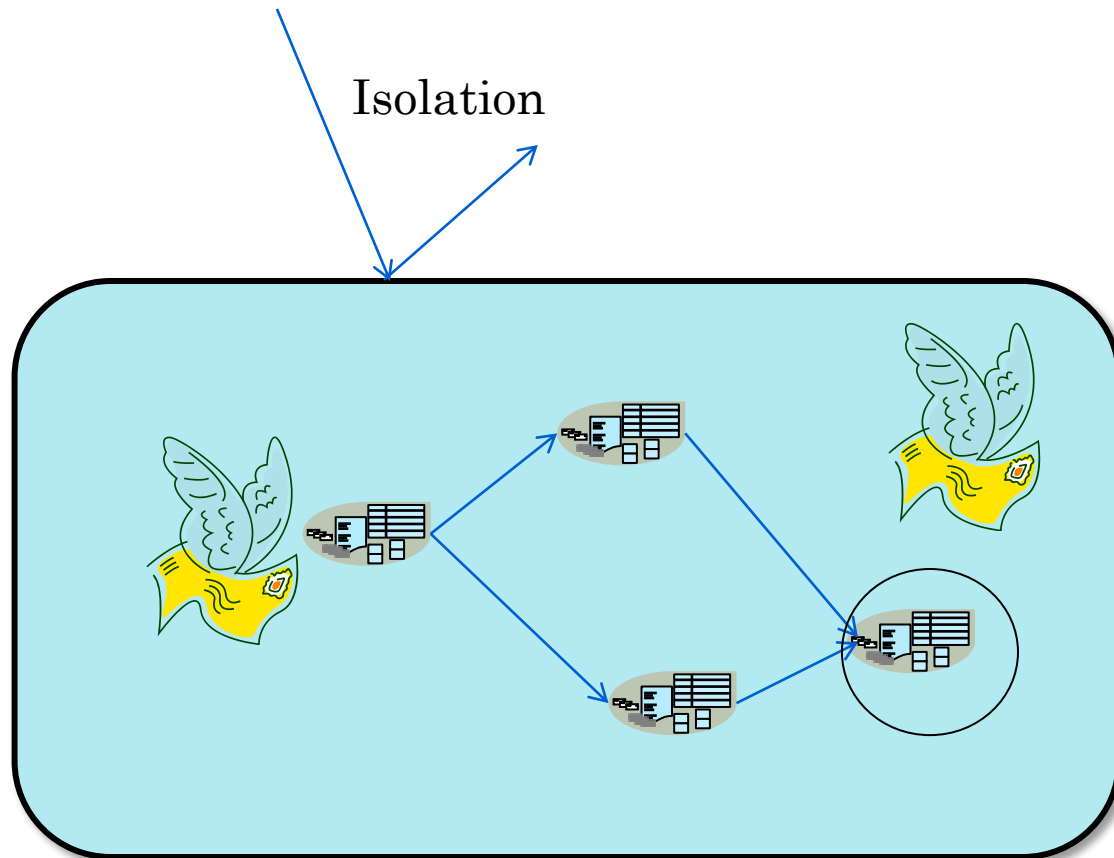


SYSTEM IS COMPOSED OF GRAINS

Silo (process)



TRANSACTIONS



Isolation

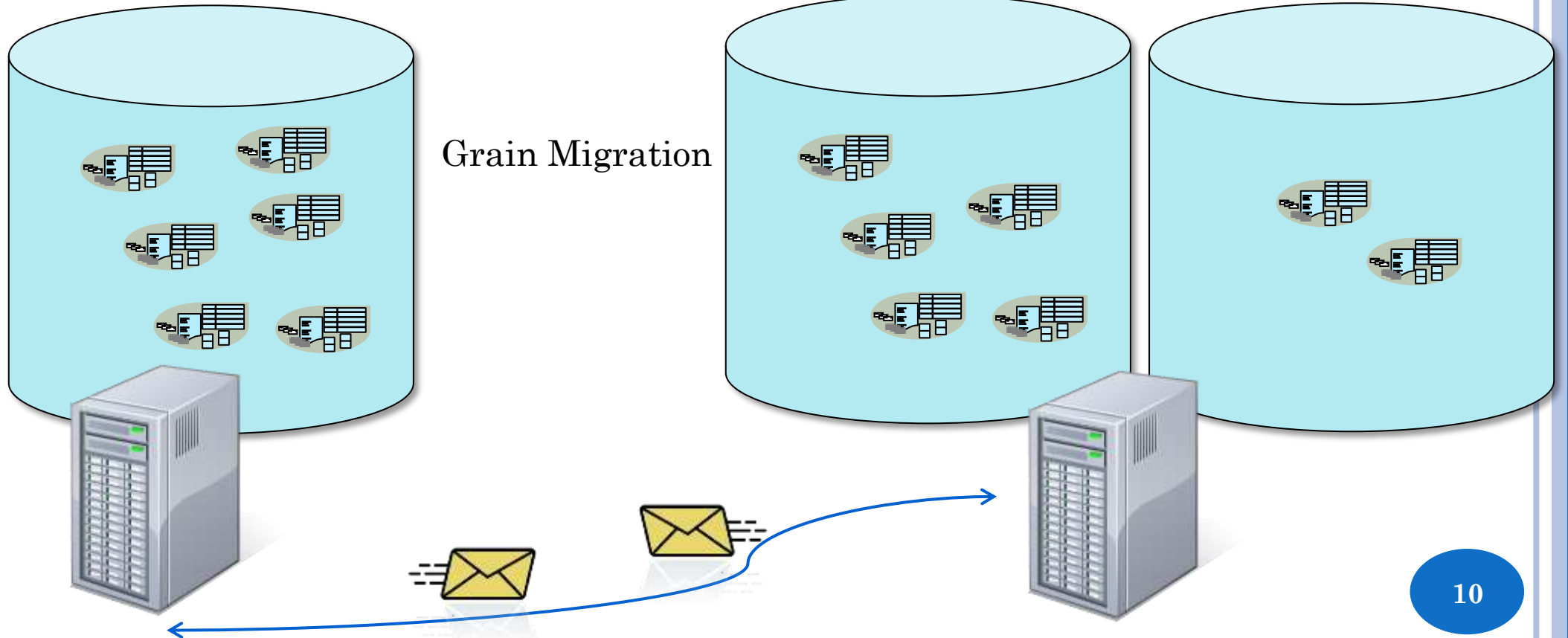
Atomicity

Consistency

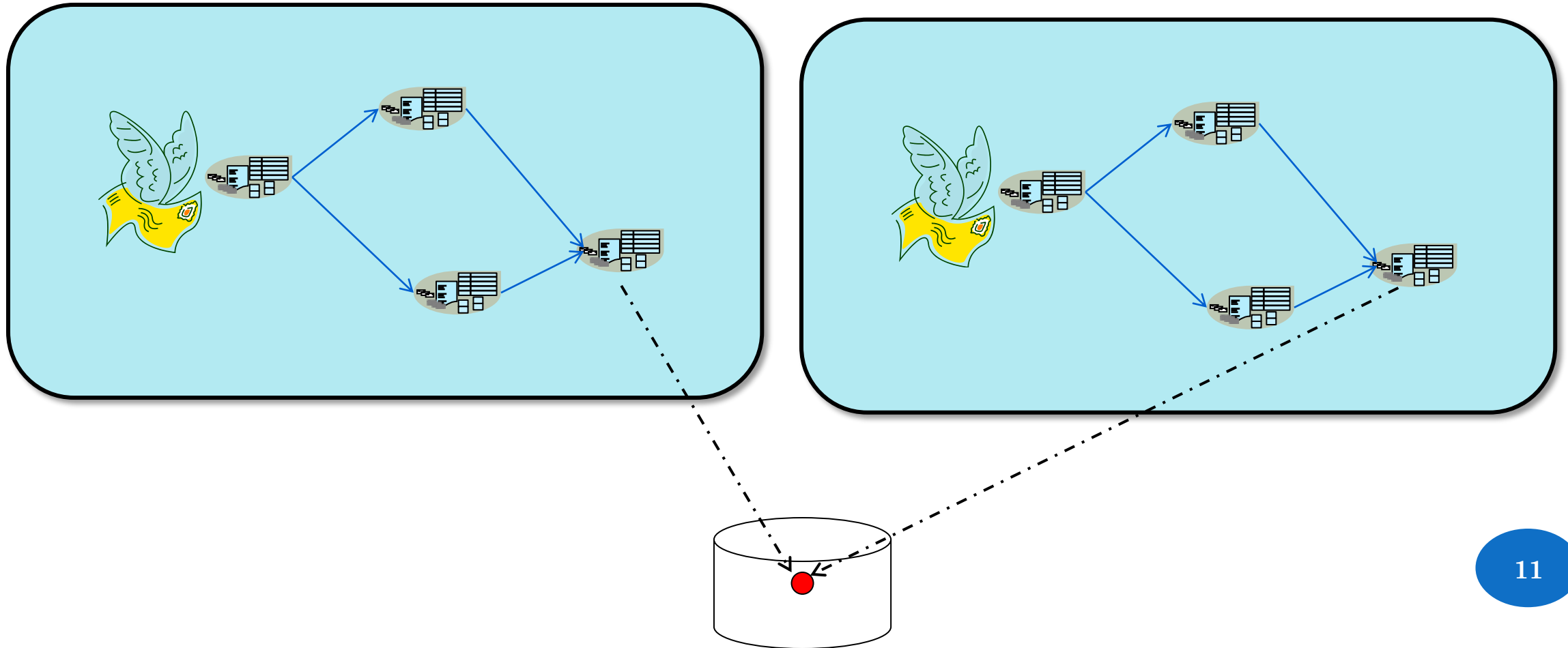
ADAPTIVE PERFORMANCE MANAGEMENT



Grain Placement



PERSISTENCE



CONCLUSION

- Orleans provides explicit support for key aspects of cloud software
 - Communications
 - Concurrency
 - Data partitioning
 - Computation replication
 - Error handling
 - Performance monitoring and control
- Shifts burden from developer to Orleans
- Make the cloud accessible to everyone