

Microservices Fundamentals

INTRODUCING MICROSERVICES



Mark Heath

CLOUD ARCHITECT

@mark_heath www.markheath.net



Overview



What are “microservices”?

Limitations of “monoliths”

Challenges of microservices

Sample application



Later in This Course



Architecting microservices



Building microservices



Communicating between microservices



Securing microservices



Delivering microservices

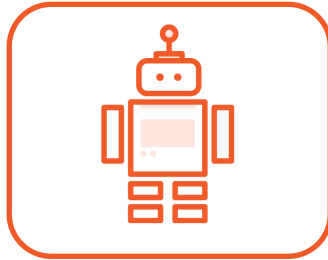
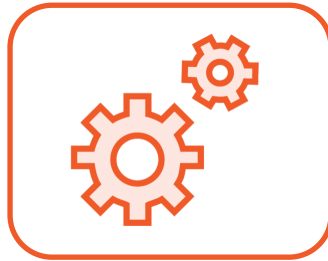
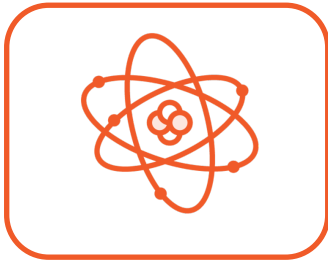




What are microservices?

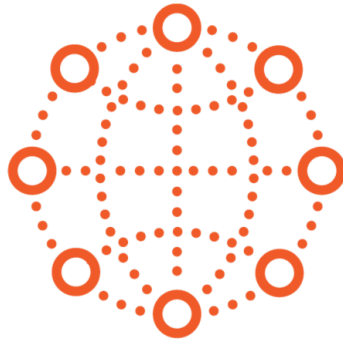


Microservices

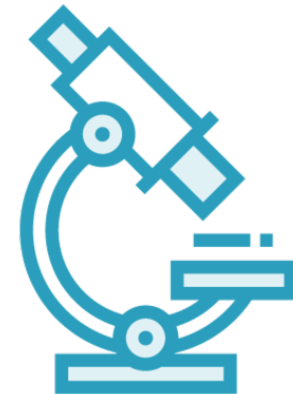


**autonomous,
independently
deployable services...**

...**collaborate** to
form an **application**



How **small** should
they be?





Why do we need
microservices?





“Monoliths”

Single codebase

Single process

Single host

Single database

Consistent technology



Monolith Benefits



Simplicity

One codebase

- Easy to find things

Deployment

- One application to replace

Monoliths are not “wrong”





Do you really need
microservices?



The Problem of Scale



Monoliths
can work
well for **small**
applications



Many developers



Many users



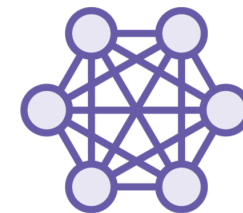
Big data



Difficult to maintain



Technical debt



Entangled modules



Monolith Problems



Difficult to deploy

- Risky
- Requires downtime

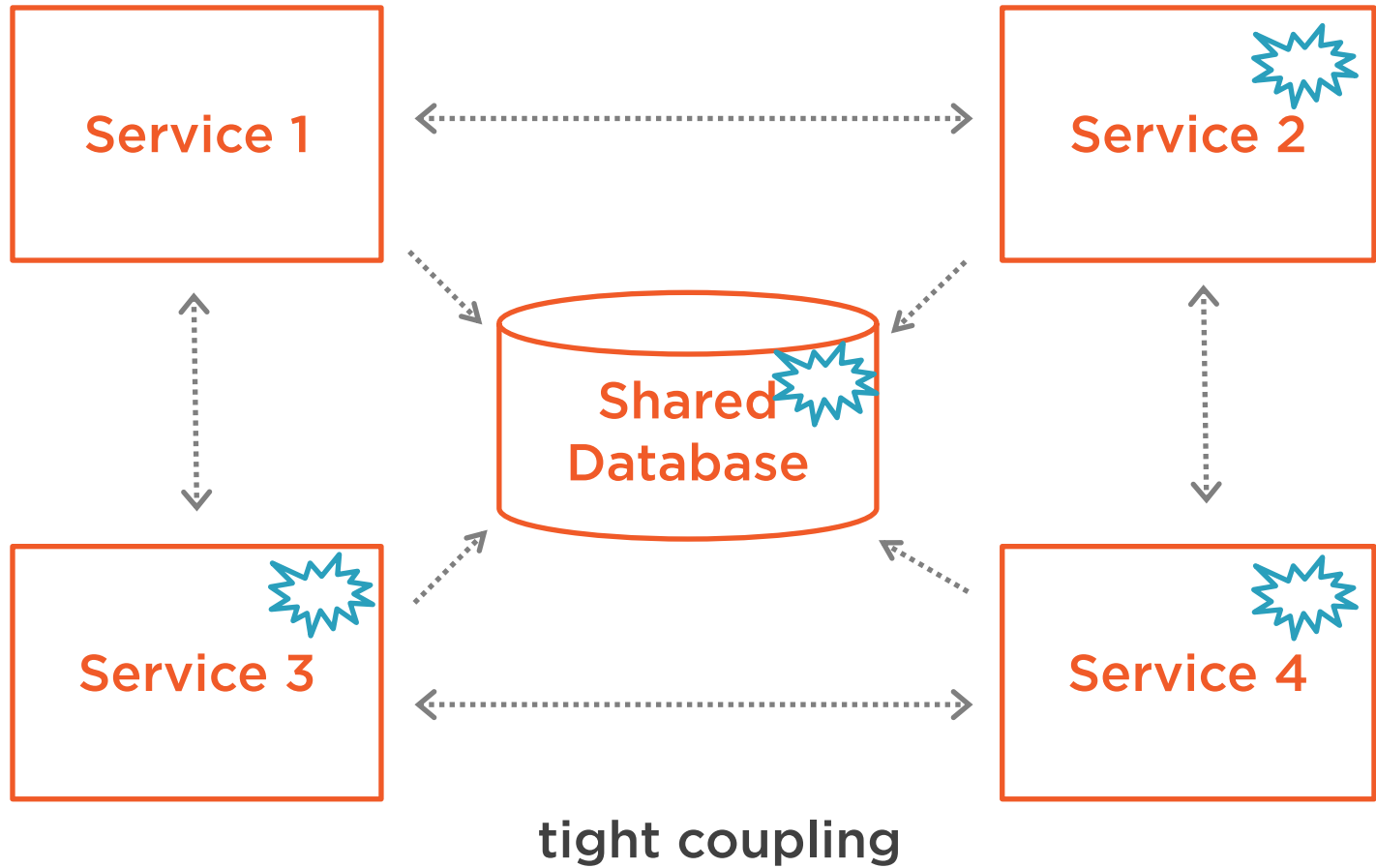
Difficult to scale

- Horizontal scaling often not possible
- Vertical scaling is expensive
- Whole application must be scaled

Wedded to legacy technology

- Reduces agility

Distributed Monoliths



Everything must
be deployed
together

New features
require **changes**
everywhere





How are microservices
better than monoliths?





How can microservices
help us?



Benefits of Microservices

Small Services

- Can be owned by a team
- Easier to understand
- Can be rewritten

Technology Choice

- Adopt new technology
- Use the right tool
- Standardize where it makes sense

Individual Deployment

- Lower risk
- Minimize downtime
- Frequent updates

Scaling

- Scale services individually
- Cost-effective

Agility

- Adapt rapidly
- Easier reuse





What are the downsides of
microservices?



Microservices solve some
problems, but bring new
challenges



Challenges of Microservices

Developer Productivity

How can we make it easy for developers to be productive working on the system?

Complex Interactions

Take care to avoid inefficient, chatty communications between microservices

Deployment

You will need to automate the process

Monitoring

We need a centralized place to check logs and monitor for problems



You can succeed with
microservices



Introducing the Demo Application



https://github.com/dotnet-architecture/eShopOnContainers

dotnet-architecture / eShopOnContainers

Watch

1,377

★ Unstar

11,384

🍴 Fork

4,638

<> Code

🔔 Issues 28

🔗 Pull requests 10

📁 Projects 1

📖 Wiki

🛡 Security

📊 Insights

Easy to get started sample reference microservice and container based application. Cross-platform on Linux and Windows Docker Containers, powered by .NET Core 2.2, Docker engine and optionally Azure, Kubernetes or Service Fabric. Supports Visual Studio, VS for Mac and CLI based environments with Docker CLI, dotnet CLI, VS Code or any other code ...

docker

netcore

windowscontainers

xamarin

spa

microservices

ddd

ddd-patterns

📄 3,276 commits

🌿 90 branches

📦 14 releases

👤 96 contributors

📄 MIT

Branch: dev

New pull request

Create new file

Upload files

Find File

Clone or download



mvelosop Merge branch 'clean-up/move-ebooks' into dev

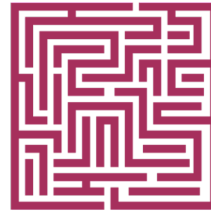
Latest commit 86f7d53 8 days ago

📁 Components	Add GeolocatorPlugin-1.0.3 to IOS and Windows project	2 years ago
📁 ServiceFabric	Added SF sln for gruping all sf projects	2 years ago
📁 build	updated build def for webspa, mvc & status	3 months ago
📁 cli-linux	Improve build-bits-linux.sh (removed dotnet restore (doing with publi...	2 years ago
📁 cli-mac	Update project list in mac build script	2 years ago
📁 cli-windows	Updateded to Show Message to run as administrator	5 months ago
📁 deploy	typo	8 months ago
📁 docs/Decks	e-books moved to https://github.com/dotnet-architecture/eBooks	8 days ago





E-commerce



Non-trivial



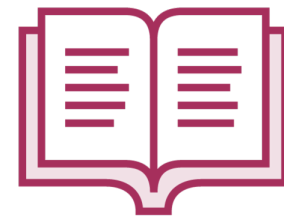
Actively Maintained



Containerized



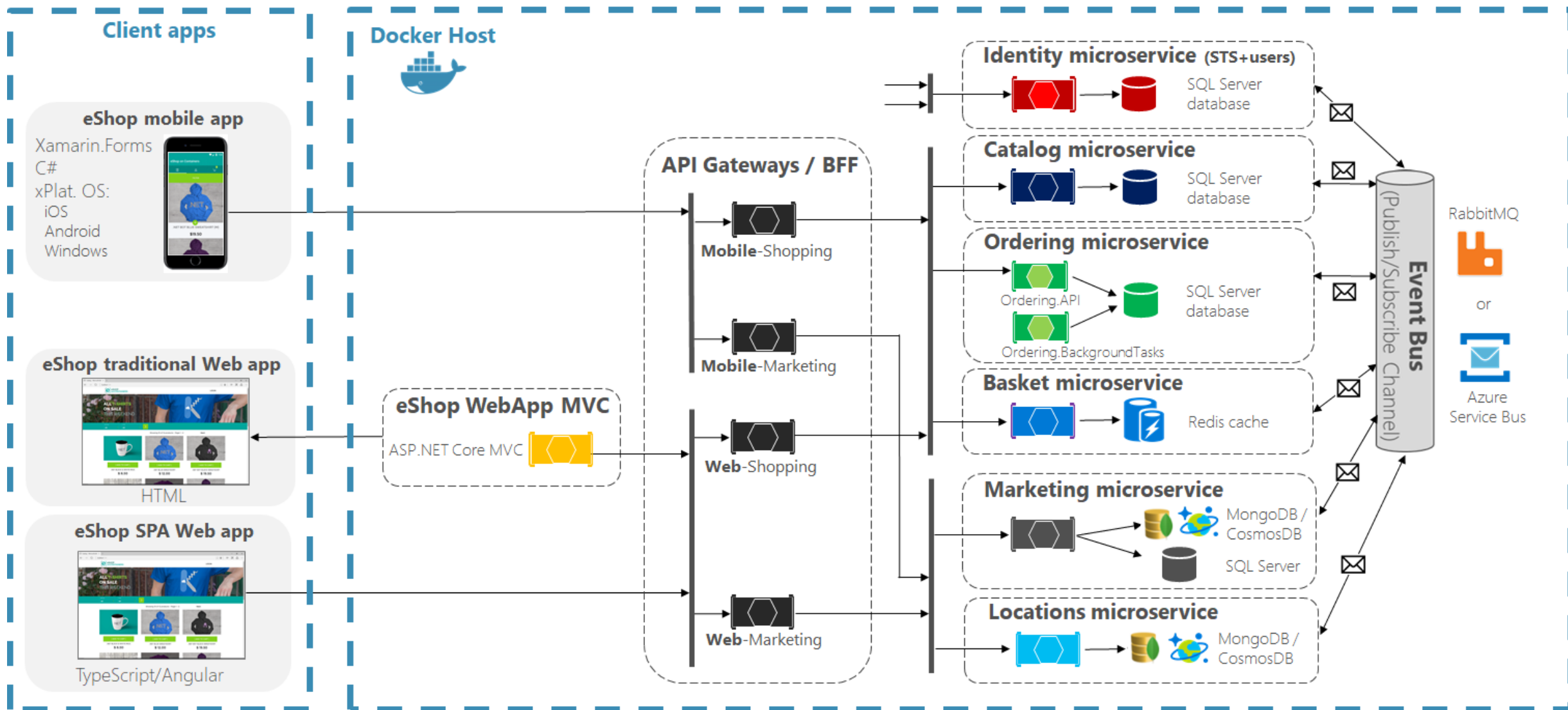
Cross-platform



Great documentation



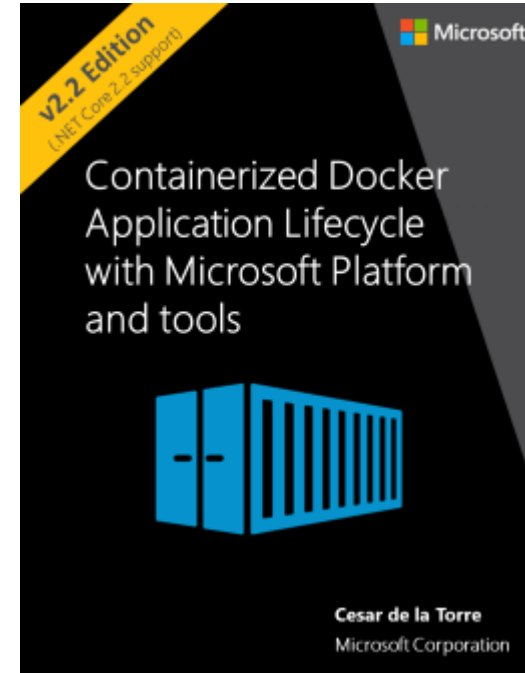
eShopOnContainers Architecture



Free e-Books



<https://aka.ms/microserviceesebook>



<https://aka.ms/dockerlifecycleebook>



Microservices Give You Choice



Microservices do not dictate technology choices



Use your favorite programming language and tools



eShopOnContainers uses .NET and Azure



Summary



Microservice architecture

- Comparison with monoliths
- Benefits over monoliths
- Challenges of microservices



Up next...

Architecting microservices

