Quality Never Goes Out of Style: Applying Lessons Learned from SOA, Web Service, and REST API Testing to Microservices

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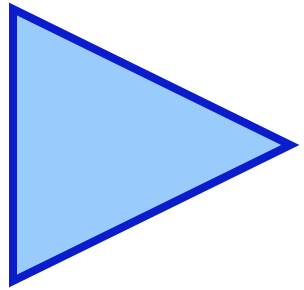
Agenda

- Introduction
- About the attendees
- Four decades of distributed computing evolution
- Similarities and differences for testing
- Leveraging proven best practices



About the Attendees

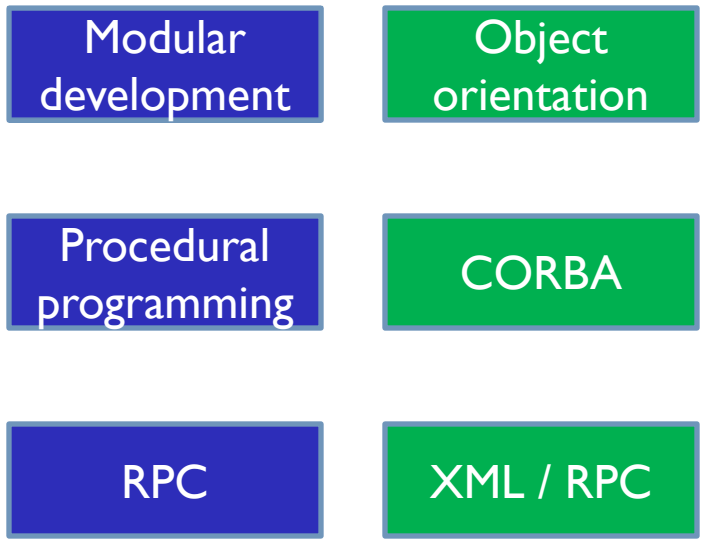
- How many using APIs as gateways to Microservices?
- How many using direct GUI front-end to Microservices?
- How many applying API testing tools for Microservices?
- How many applying GUI testing tools for Microservices?

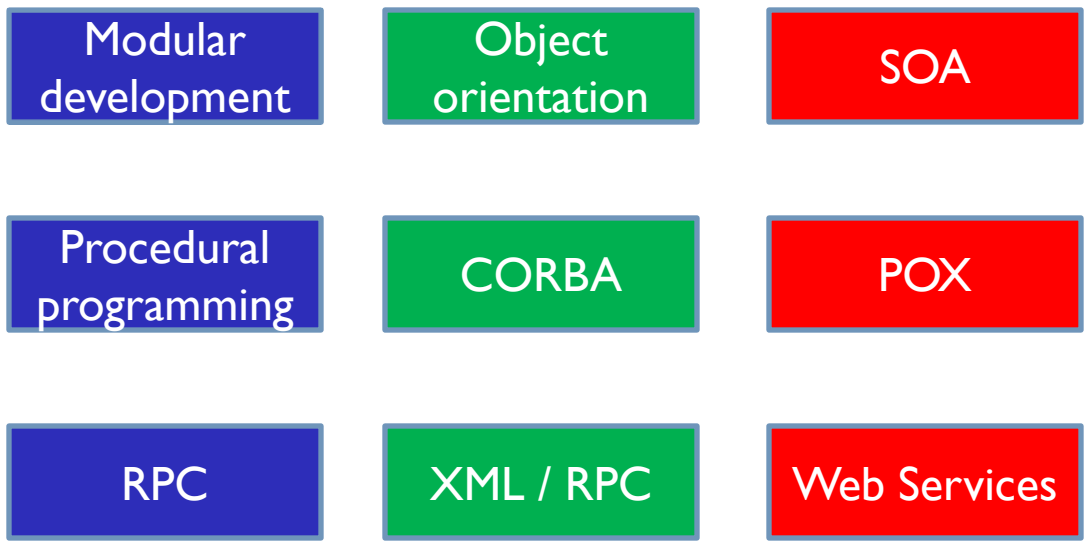
Modular development

Procedural programming

RPC

1980s


Modular development
Object orientation
Procedural programming
CORBA
RPC
XML / RPC
1980s
1990s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Web Services
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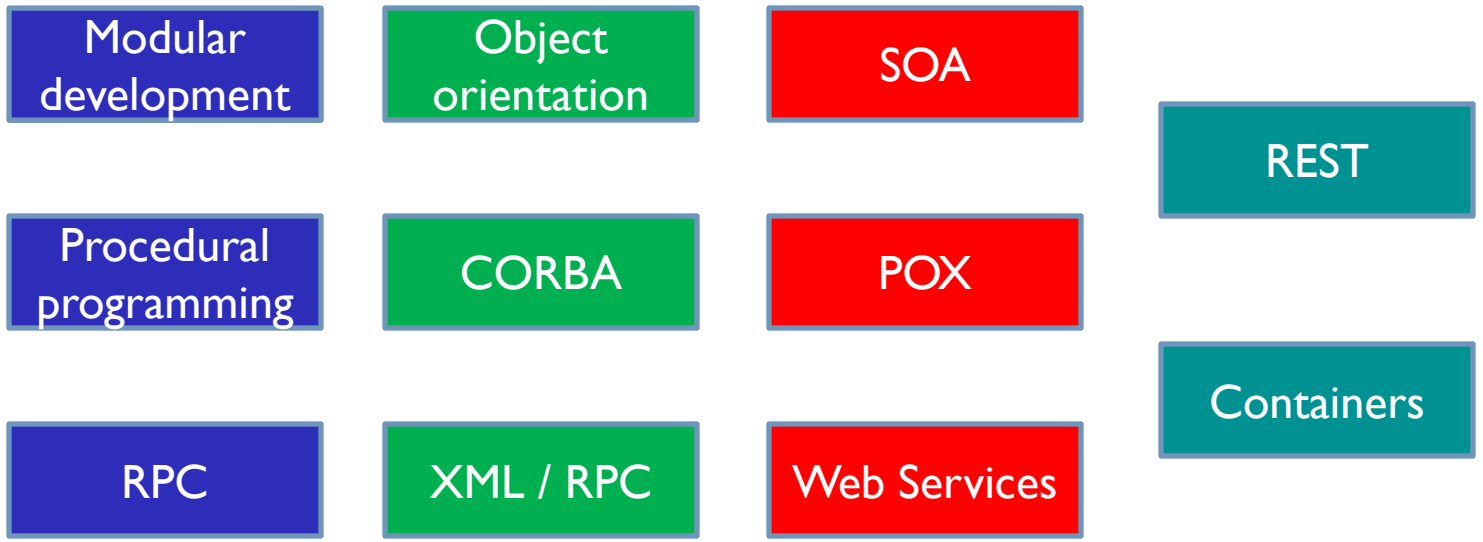
2000s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REST
Containers
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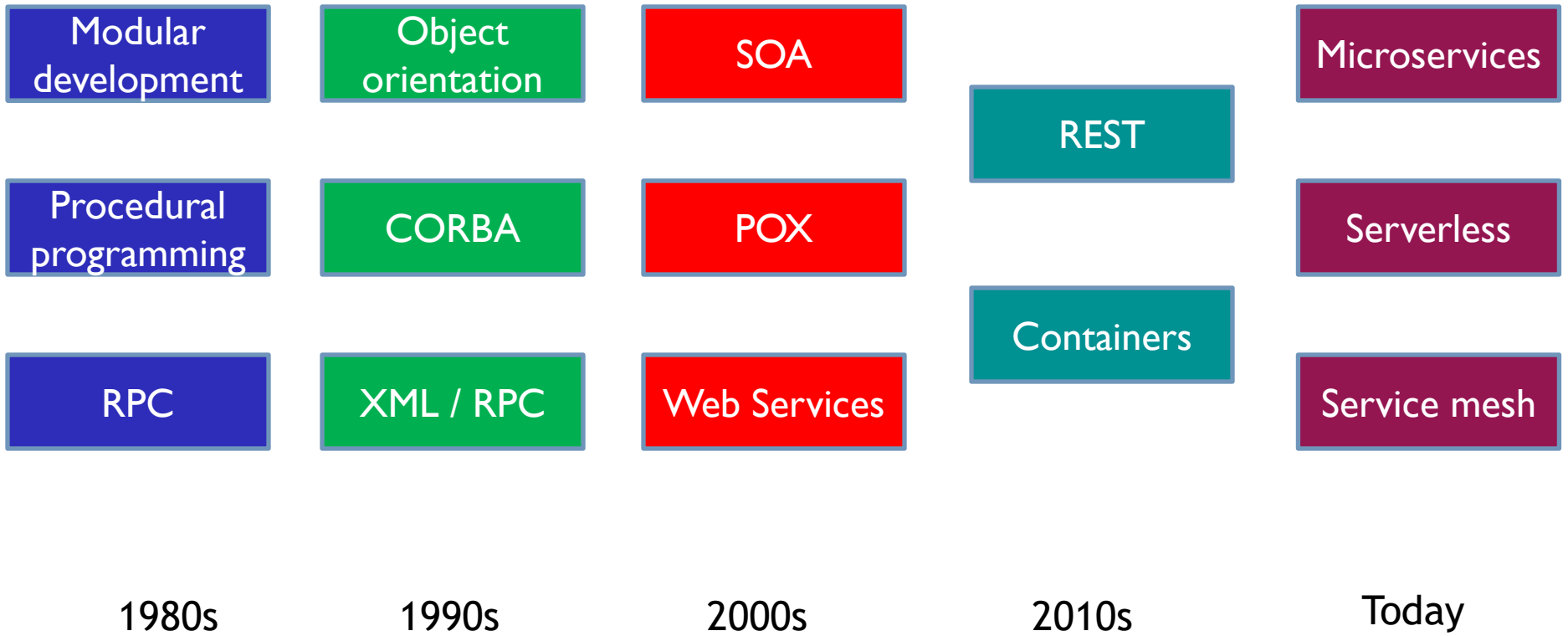
2010s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POX
Web Services
REST
Containers
Microservices
Serverless
Service mesh
1980s
1990s
2000s
2010s
Today

The More Things Change…

- Like fingerprints and snowflakes, no two SOA implementations, Web services, or REST APIs are identical
  - The same is true for Microservices

- Designing these assets is a combination of art and science
  - But there are universal, well-proven testing patterns
  - And these best practices remain relevant today

SOA vs. Microservices

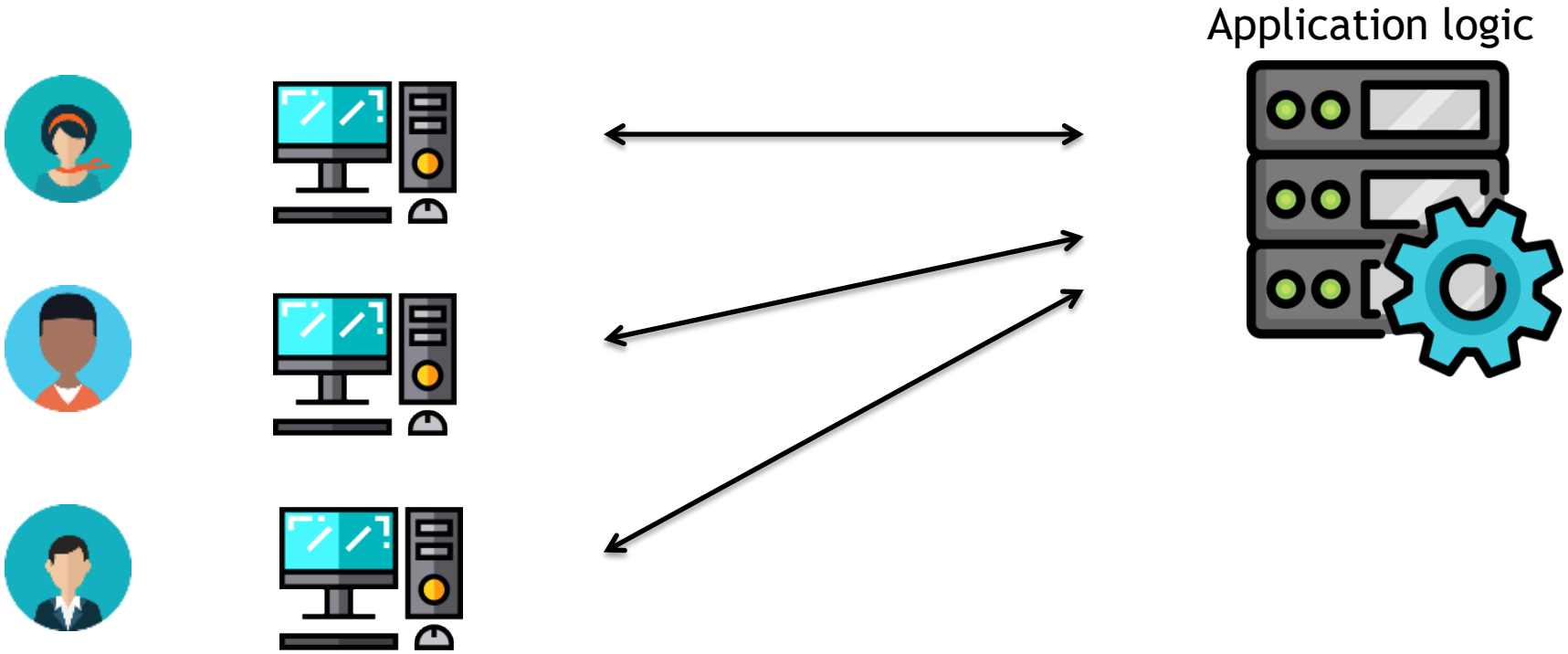
SOA

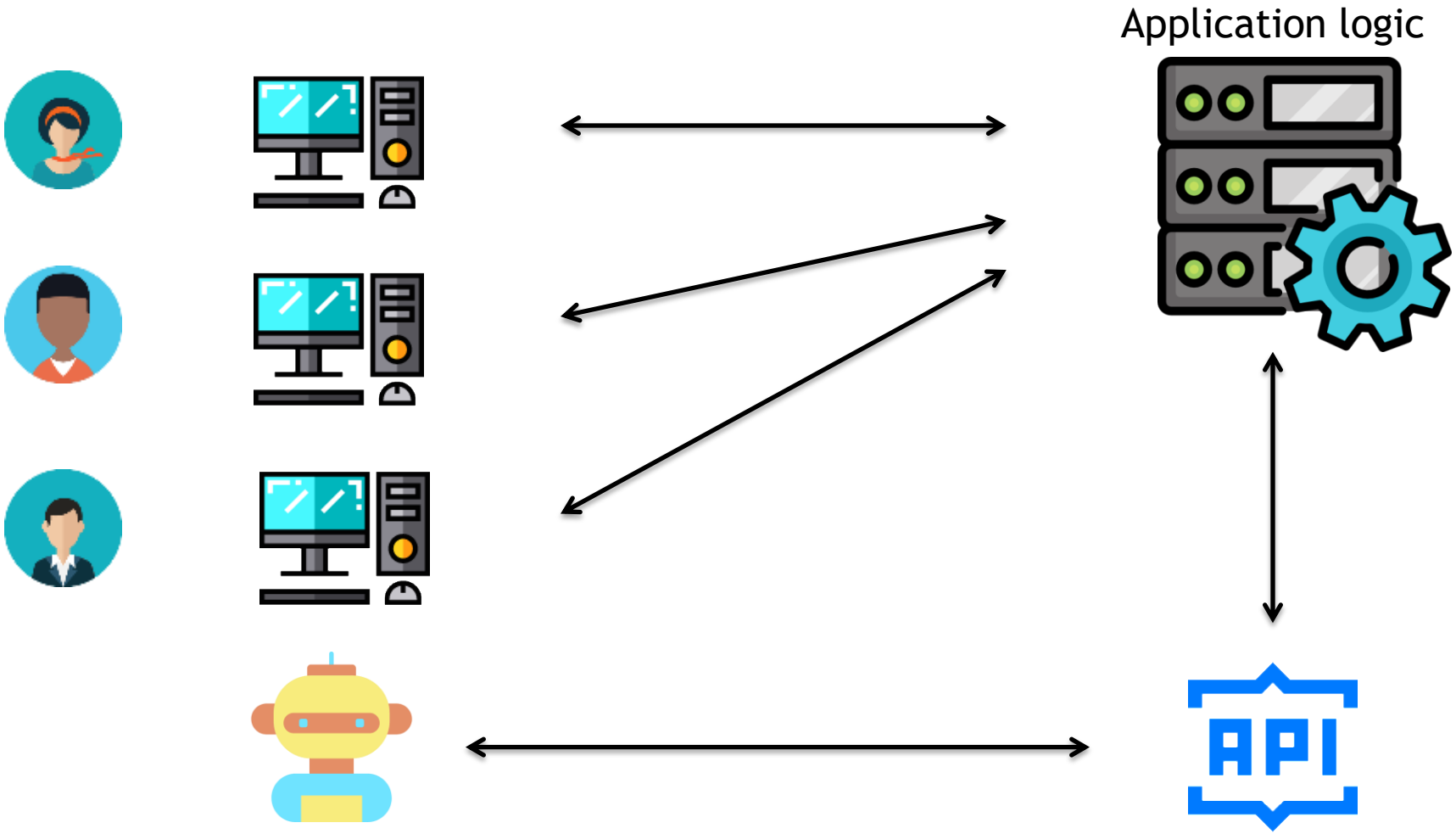
- Focus on reusability
- Not reliant on DevOps
- Multiple protocols
- Deployed on base platform
- Not meant for containers
- Governance is essential

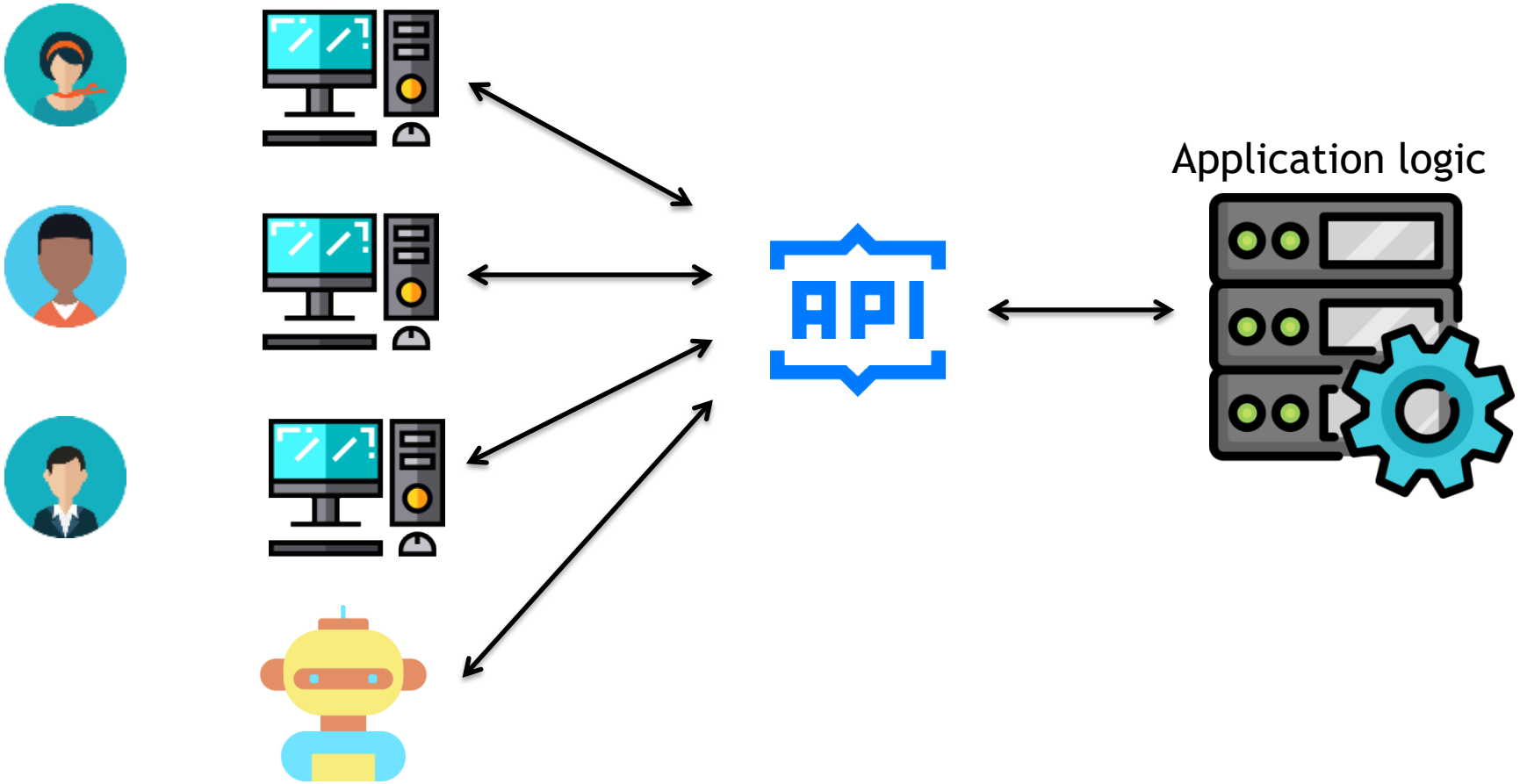
Microservices

- Focus on decoupling
- Uses DevOps/CD
- Lightweight protocols
- Deployed in cloud
- Ideal for containers
- Governance is optional

Courtesy Rade Despodovski/Dzone.com


Application logic


Application logic
API


API
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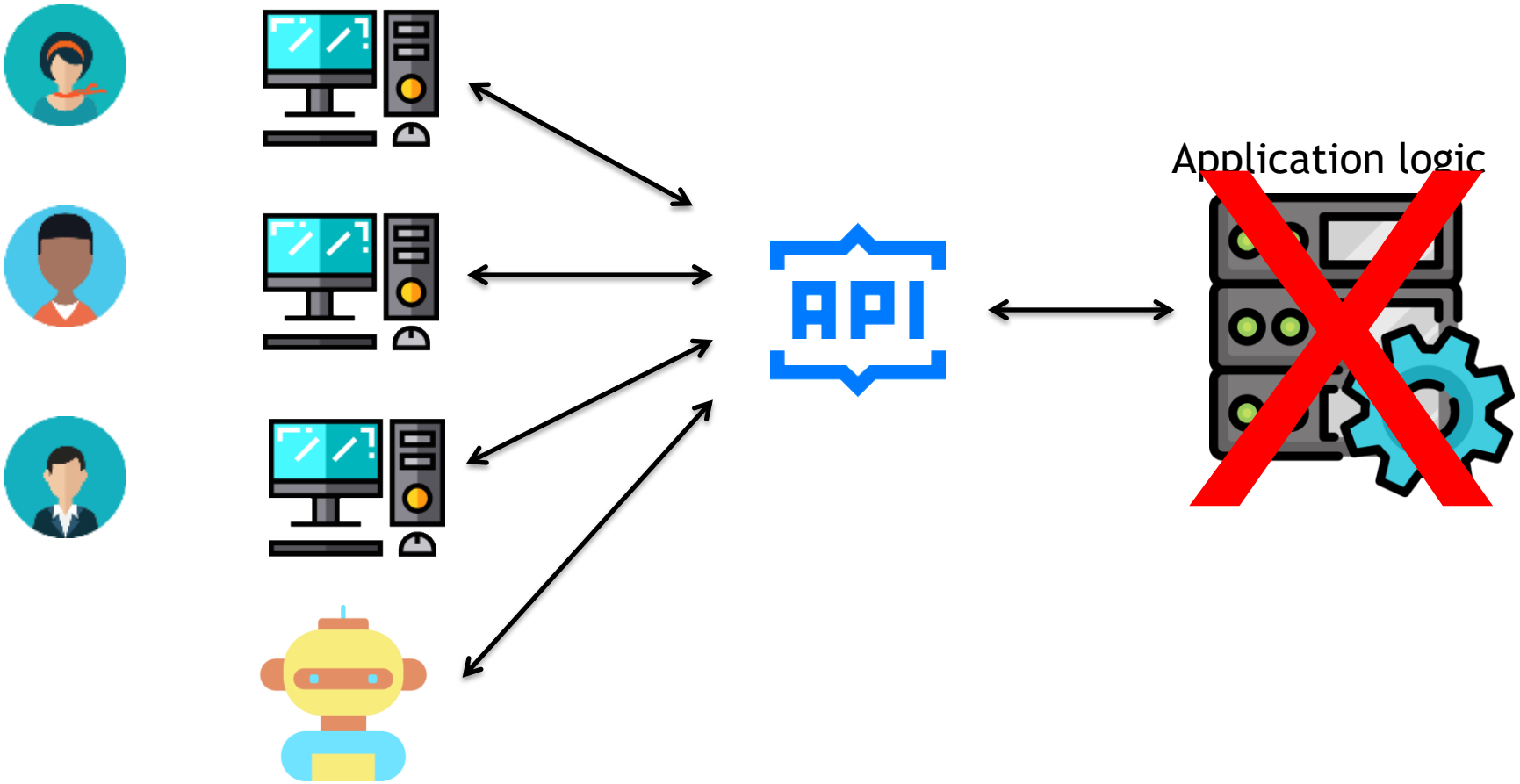
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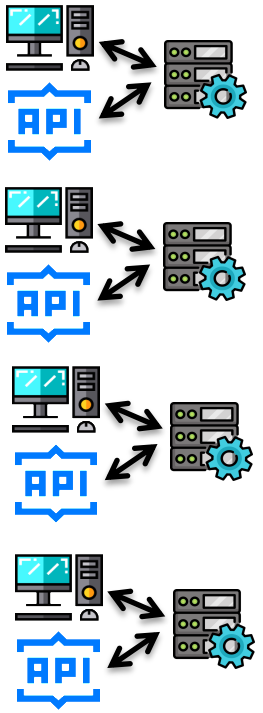
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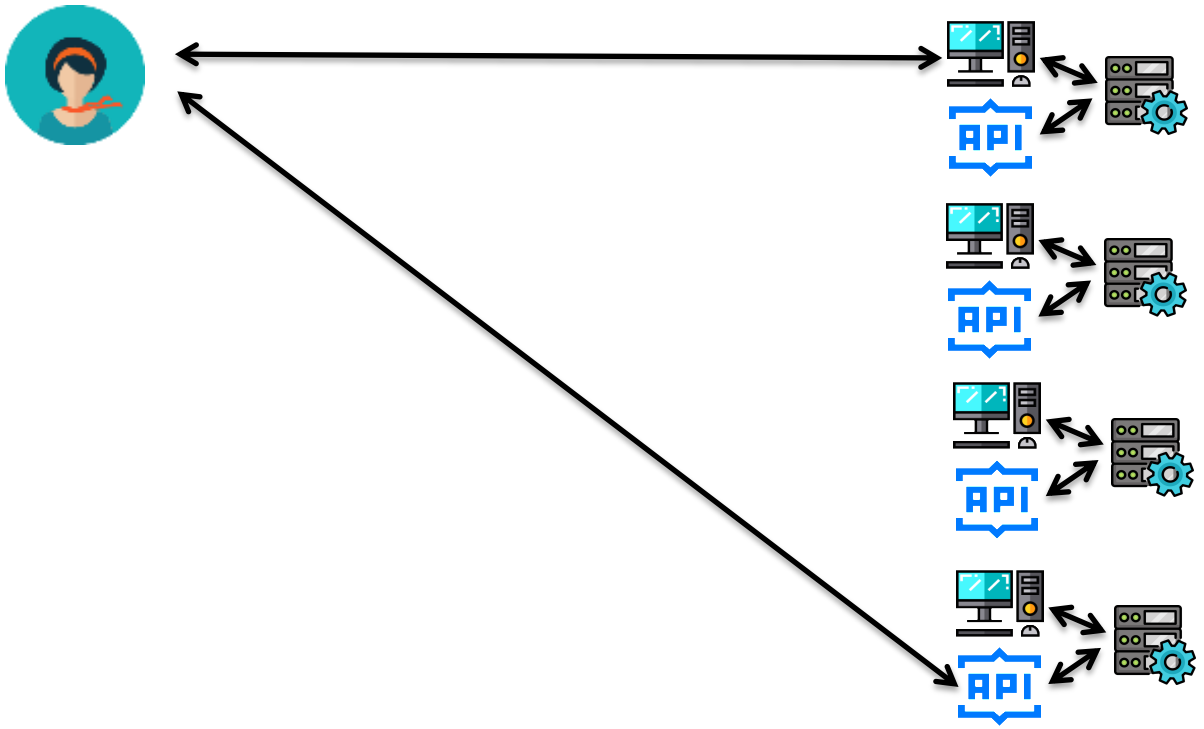
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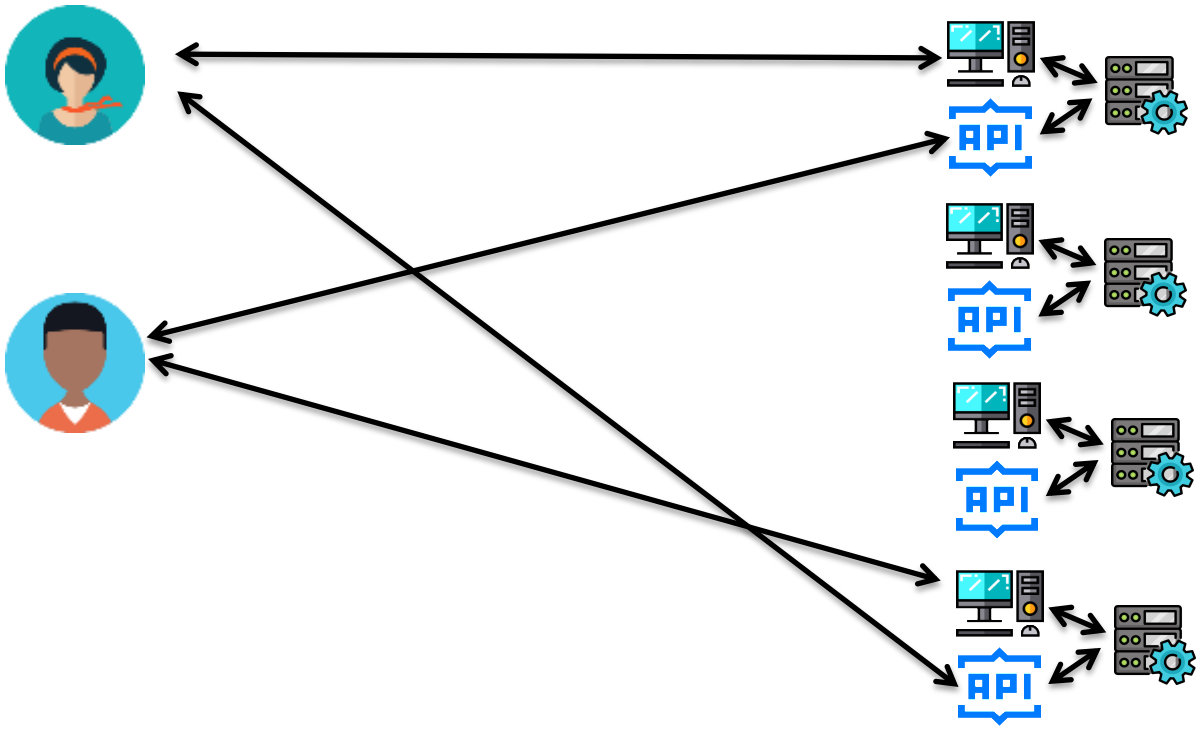
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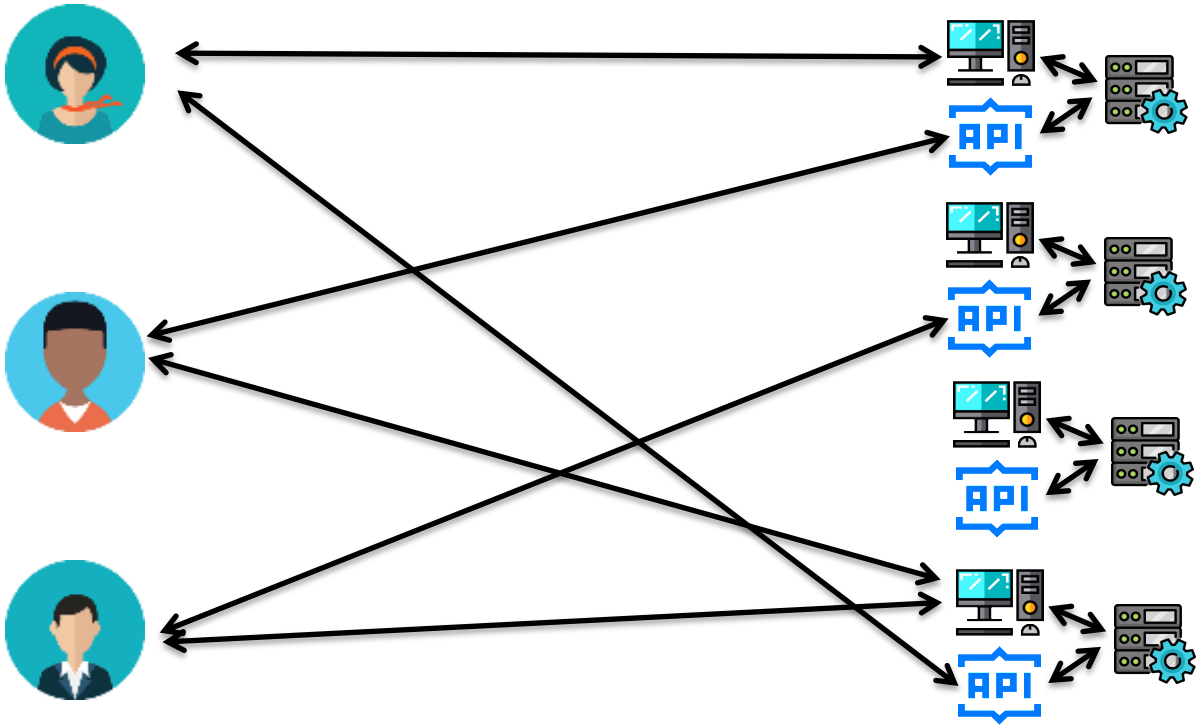
API
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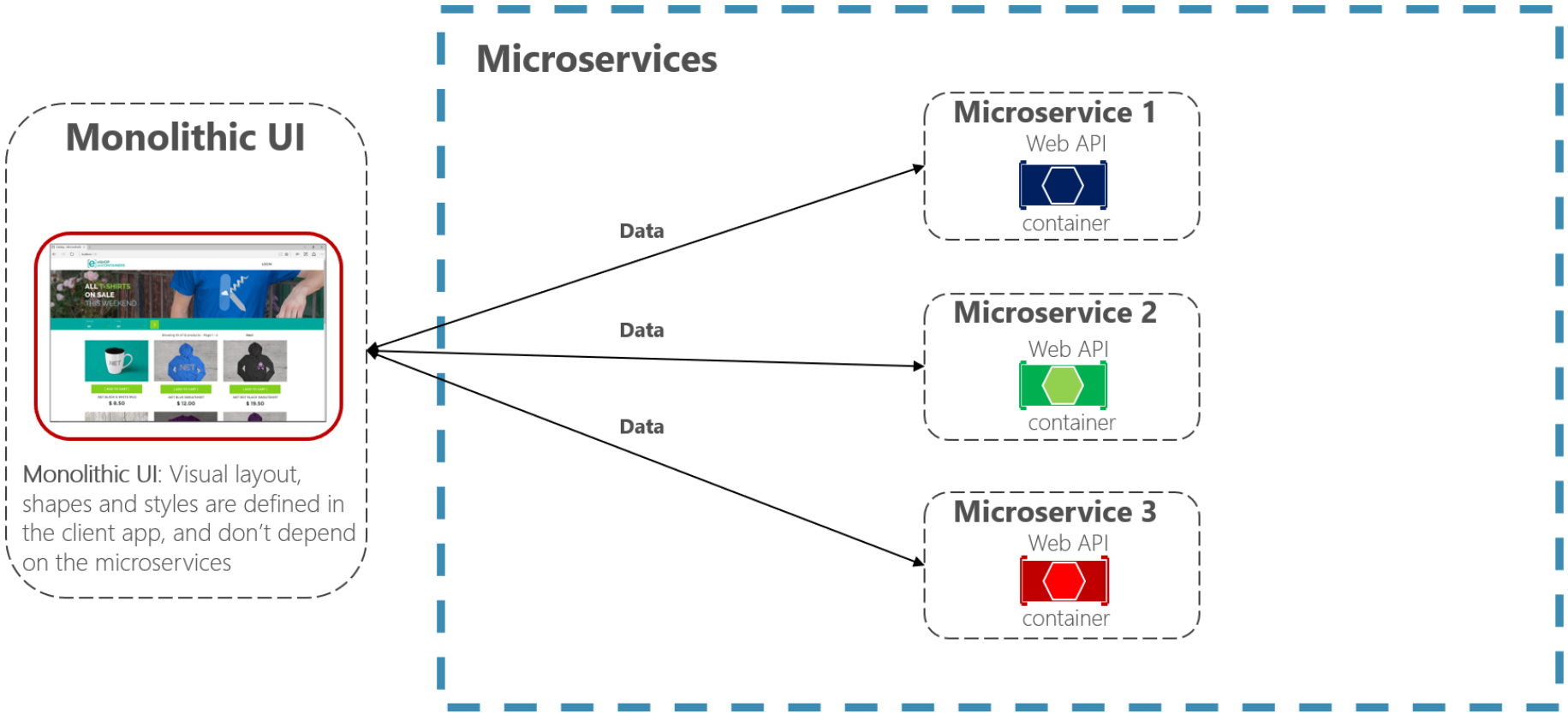
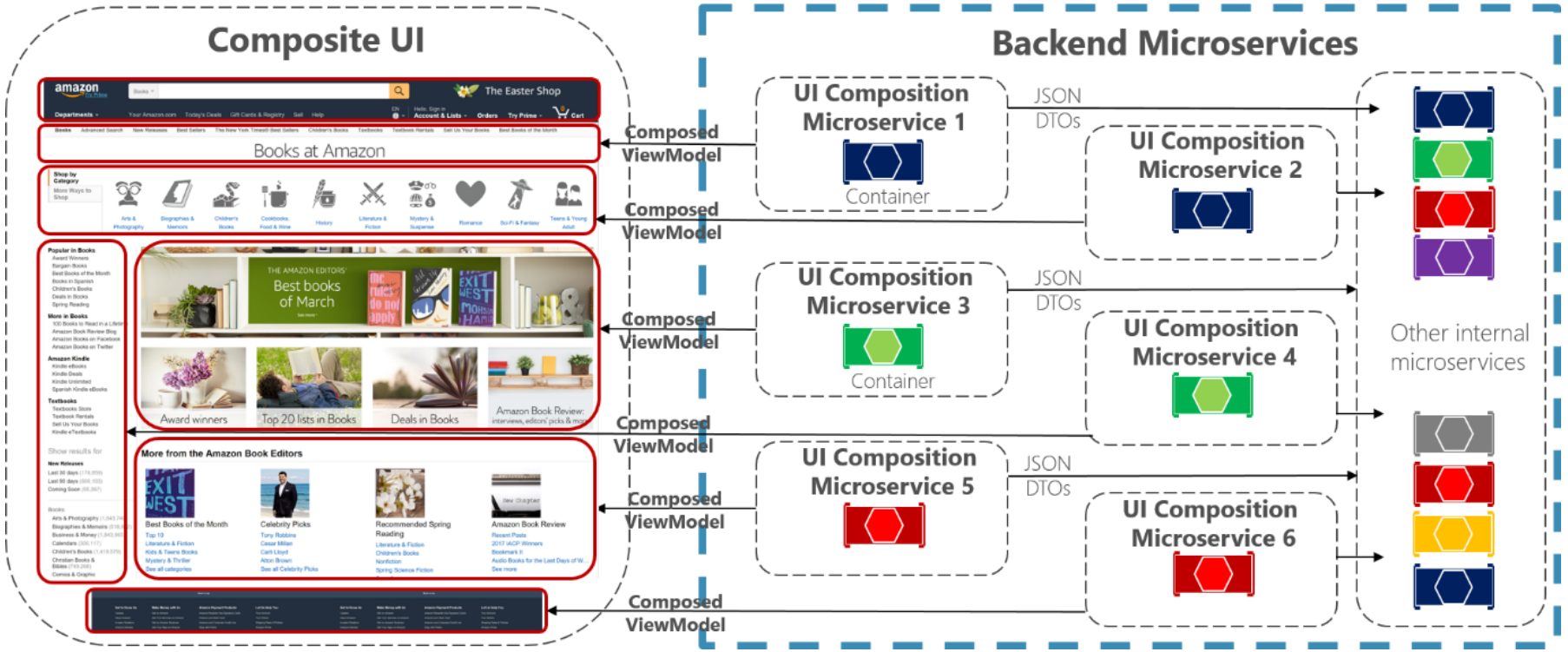
Monolithic UI consuming microservices



Courtesy Microsoft

Composite UI *generated* by microservices



Courtesy Microsoft

What Hasn't Changed About Testing?

- Lots of resources (i.e. APIs, Microservices) to evaluate
- Mission-critical assets
- Yet often under-examined
  - Complexity
  - Time pressure
  - Lack of process
  - Insufficient tooling

What's Different about Testing?

- Microservices often are a much more fine-grained implementation
- More likely to leverage cutting-edge architecture
  - Containers
  - Serverless
  - Service mesh
- GUI front-end complications

Leveraging Proven Best Practices

- There's no need to reinvent the wheel when testing Microservices

- Each of these patterns is still relevant:
  - Apply testing automation
  - Use meaningful amounts of data
  - Test for performance
  - Employ governance whenever possible
  - Go beyond unit testing

Applying Test Automation

- What hasn't changed?
  - CI/CD
  - Agile

- Microservice differences
  - Developers regularly build unit tests in the front end
  - This purely GUI approach makes it difficult to attain full code coverage

Recommendations

- Carry out testing automation on two fronts
  - Use BDD tools such as Cucumber to drive End-to-End (E2E) tests
  - Use the OpenAPI specification + test tools to automate heavy volumes of testing via the API
  -
- This two-pronged strategy is both scalable and thorough

Data-Driven Testing

- What hasn't changed?
  - Hard-coded data
  - Very few scenarios
  - Minimal assertion coverage on responses

- Microservice differences
  - GUI-driven testing can make it far too time consuming to develop hundreds, thousands, or millions of permutations
  - Not easy to use randomized data

Recommendations

- Use ETL tools to copy data from production to staging
  - Remove PII or other sensitive information
- Consider data generators to power API side of testing

Test for Performance

- What hasn't changed?
  - High traffic volume in production
  - Yet this type of testing is frequently overlooked

- Microservice differences
  - Autoscaling infrastructure has made load testing less important
    - "Throw hardware at the problem"
  - But this can result in unnecessary costs for non optimized microservices

Recommendations

- Modern API testing tools integrate nicely with performance testing technologies
  - This two-pronged strategy is both scalable and thorough
- Include orchestrated functional tests in performance evaluations
  - Not just unit tests at high volume

Governance

- What hasn't changed?
  - Brittleness of test assets
  - Lots of 'reinventing the wheel'

- Microservice differences
  - Tooling has greatly improved
  - So have procedures

Recommendations

- Employ technology wherever possible
  - Git
  - Wikis
- Create a ‘single point of truth’
- Build a culture of sharing and reuse
  - Including keeping track of test results over time
  - Leverage dashboards of test platforms, DevOps metrics, ALM tools

Orchestration

- What hasn't changed?
  - Applications are composed of many individual assets working in a logical sequence
- Microservice differences
  - Developers are more focused on unit testing
  - Diminished attention to longer-running business processes
  - Integration testing is particularly hard

Recommendations

- Gain knowledge of BDD
- Use this information to drive both front-end E2E and API tests
  - Stories are relevant regardless of the testing tool being applied
- Apply Gherkin's `Given-When-Then` as a natural language approach to capturing behaviors for a user story
- Use API mocking/virtualization to help with integration

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