CS544 EA

Overview

Intro: Integration and Architecture

Big Application

- A single big application is called a **monolith**.

- These often have **maintainability issues**:
  - A change in one place means recompiling the app
  - A change in one place could affect many other things (parts of the same big application)

Multiple Monoliths

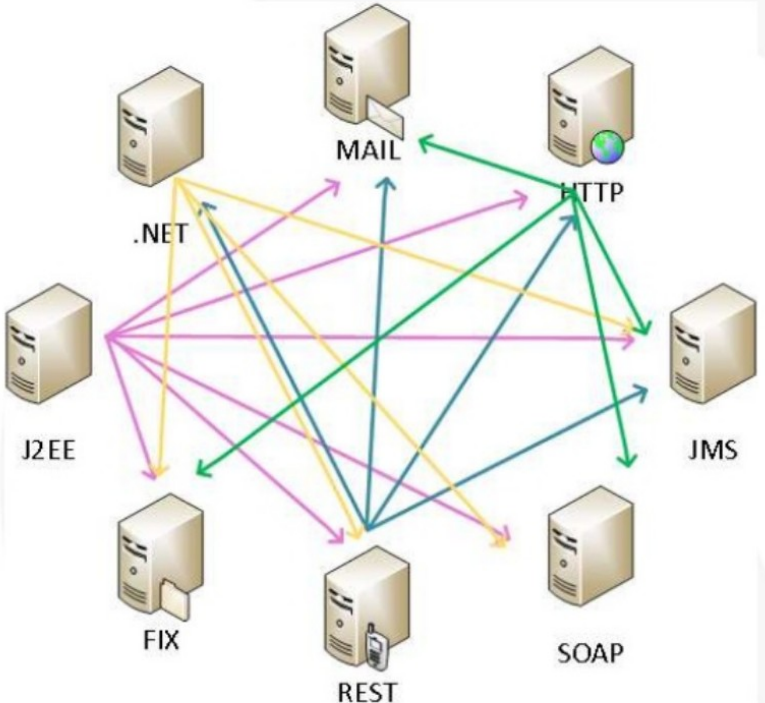
- At some point another application is made, or bought, or two businesses combine
- Whatever the reason, **integration is needed**
  - This has been true since the earliest days of Enterprise Applications

Initial Integration

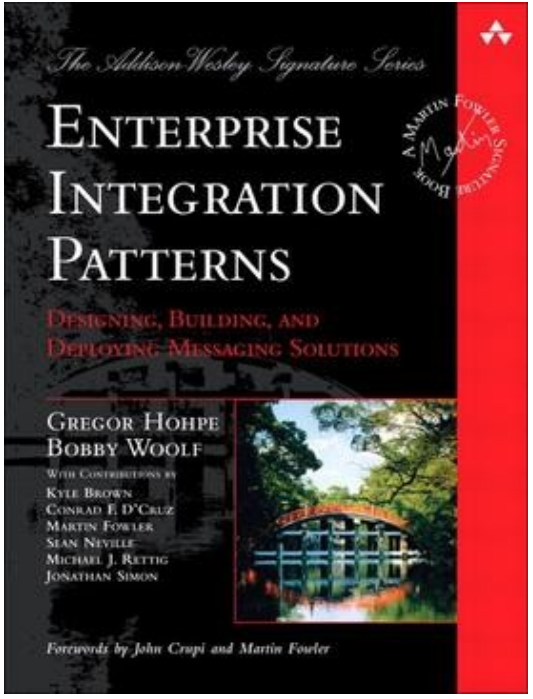
From: https://www.slideshare.net/wso2.org/resilient-enterprise-messaging-with-wso2-esb

Spaghetti Integration

What about maintainability, scalability, troubleshooting and governance?



Enterprise Integration Patterns



By Source (WP:NFCC#4), Fair use, https://en.wikipedia.org/w/index.php?curid=42964088

- Gregor Hohpe and Bobby Woolf, 2003
  - We will introduce (mention) some of these **patterns** at the end of this course

Book specifies 4 Ways to Integrate

- Used in the past:
  - File Transfer (leaves a lot to the developer)
  - Shared Database (does not scale as well)

- Modern approaches:
  - **Remote Procedure Invocation** (synchronous)
  - **Messaging** (Asynchronous)

Integration and Architecture

- **Integration** is not just something that can be used to connect different applications
  - It can also be an **architectural solution**

- Why have one big, hard to maintain, hard to scale, monolith when you can break it into parts?
  - Each part provides a “service”

Service Oriented Architecture

- To Solve Monolith problems
  - **Separate applications** each provide their own **service**
  - The ‘service layer’ is the point of integration

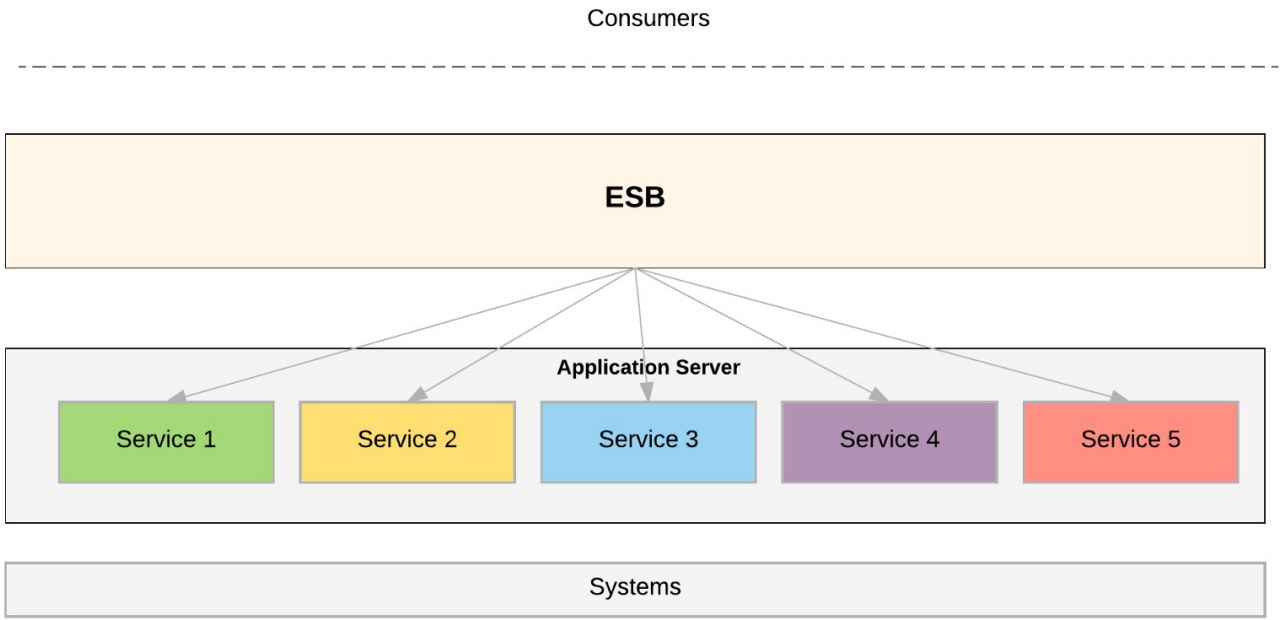
- [Wikipedia] Each service / application:
  - Represents a business activity with a specified outcome
  - Is self-contained
  - Is a black box for its consumers.
  - May consist of other underlying services

Service Oriented Architecture

- A coherent integration plan is needed, how are the different services going to communicate?
  - How are they going to be combined?

- A common solution:
  - An **Enterprise Service Bus** (ESB)
  - Coordinates activities between the services
  - Can contain logic and combine services

Enterprise Service Bus



Similar to hardware, a channel through which all communication flows

From: https://medium.com/@kasunindrasiri/microservices-apis-and-integration-7661448e8a86

ESB

- ESBs generally **contain logic** to provide:
  - Routing, choreography (combine), transformation, business rules

- Useful, but can also be **a real problem**:
  - Business logic spread between services and ESB (what is where?)
  - ESB is a single, monolithic, center of the application
    - Single point of failure

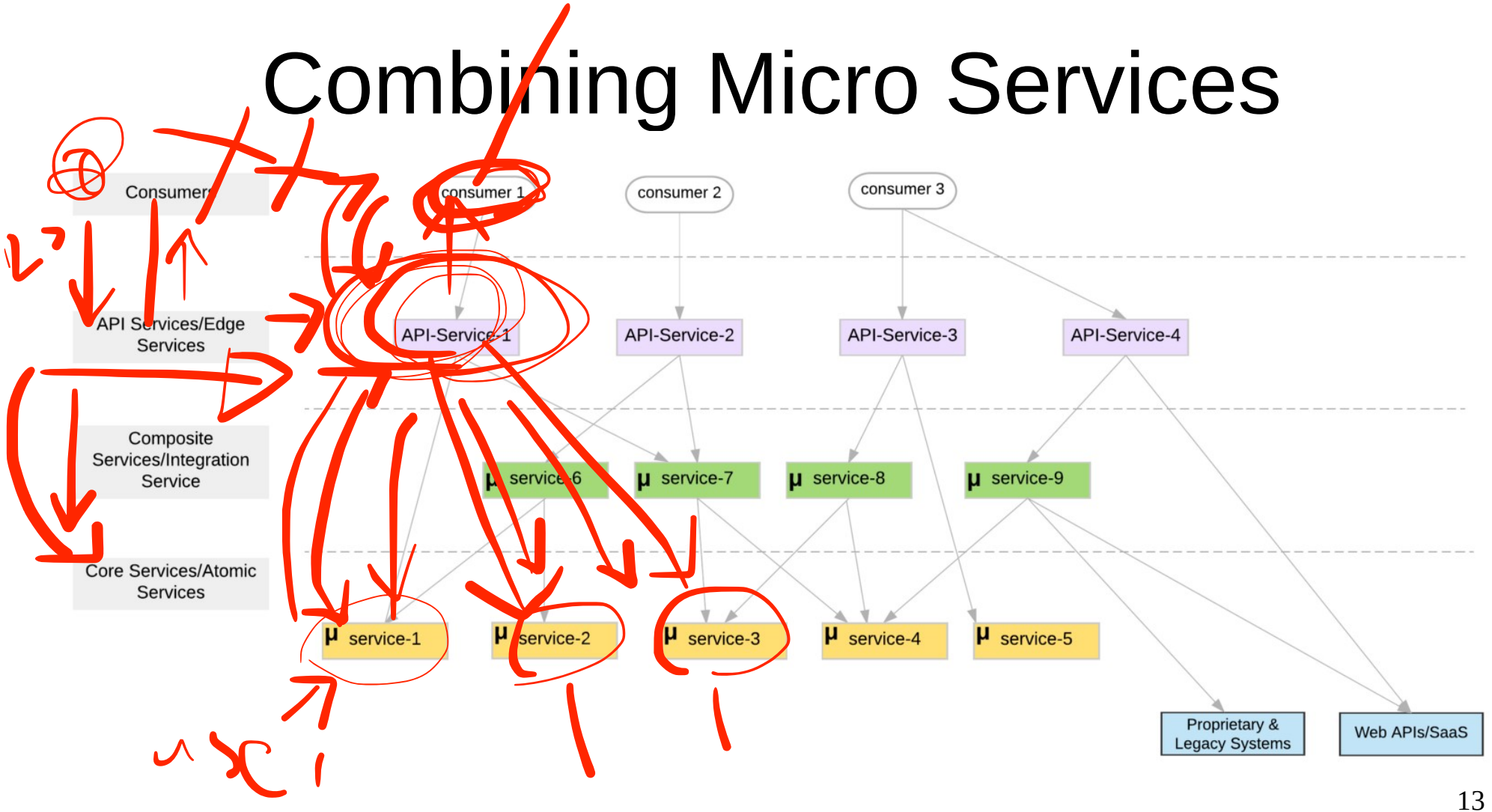
Micro Services

- The Micro Services architectural style is often seen as a response to the use of an ESB

- **Micro Services** emphasizes:
  - Smart Endpoints (services) and **Dumb Pipes**

- Also generally smaller (more fine grained) services
  - What is or is not small is undefined

Combining Micro Services



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Summary

- Once again separation of concerns is the key to maintainability and good architecture.
- By keeping each service small and simple each maintains the greatest ability adapt to change.
- Each part should do less, so that the combined whole can accomplish more.