Week 4: Service-to-Service Communication

# Unit 4: Calling the User Service via Hystrix

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# Calling the User Service via Hystrix

Resilience

**Definition of resilience:**

the ability of a system to handle unexpected situations

- without the user noticing it (best case)
- with a graceful degradation of service (worst case)

**Fallback approach for graceful degradation:**

which result to use if the call fails?

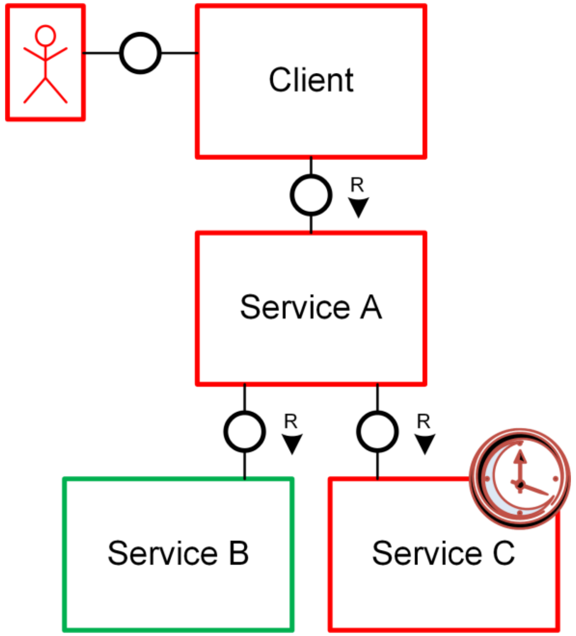
- use cached (potentially outdated) value
- use sensible default
- try second-best alternative (e.g. apply to message queue)

# Calling the User Service via Hystrix

## Challenges

Service dependencies introduce latency and other points of failure

- What if called service does not answer (in time)?
- How to avoid cascading failures / latency?
- How to avoid flooding server after restart?



### A Typical Problem Case

A customer creates an order. This triggers the order creation, and if it is successful, the warehouse system is informed for dispatching the order.

But: What should happen if the call to the warehouse system fails?

# Calling the User Service via Hystrix

Hystrix – Resilience library

## Hystrix

Easy to start with

- Many fault-tolerance patterns implementable
  - Fail fast / silent
  - Circuit breaker pattern
  - Load shedding (thread pool)
  - Advanced: request caching
- Many configuration options

**Load shedding**
requests are rejected under certain conditions

Hystrix Wiki

# Calling the User Service via Hystrix

## HystrixCommand

Wrap all potentially failing calls in a **HystrixCommand**

```
public class MyCommand extends HystrixCommand<String> {

    public MyCommand() {
        super(HystrixCommandGroupKey.Factory.asKey("ExampleGroup"));
    }

    @Override
    protected String run() {
        // creates  client, sends  request,  handles response
        return callGetUserService(id);
    }
}
```

Note: Each HystrixCommand is executed within a separate thread and is timed out automatically after 1000ms by default.

# Calling the User Service via Hystrix

## HystrixCommand – Execution patterns

### Synchronous execution

```
String string = new MyCommand().execute();
```

### Asynchronous execution

```
Future<String> future = new MyCommand().queue();
String string = future.get(); // this blocks, consider future.isDone()
```

### **Reactive execution** – inverts control flow (IoC)

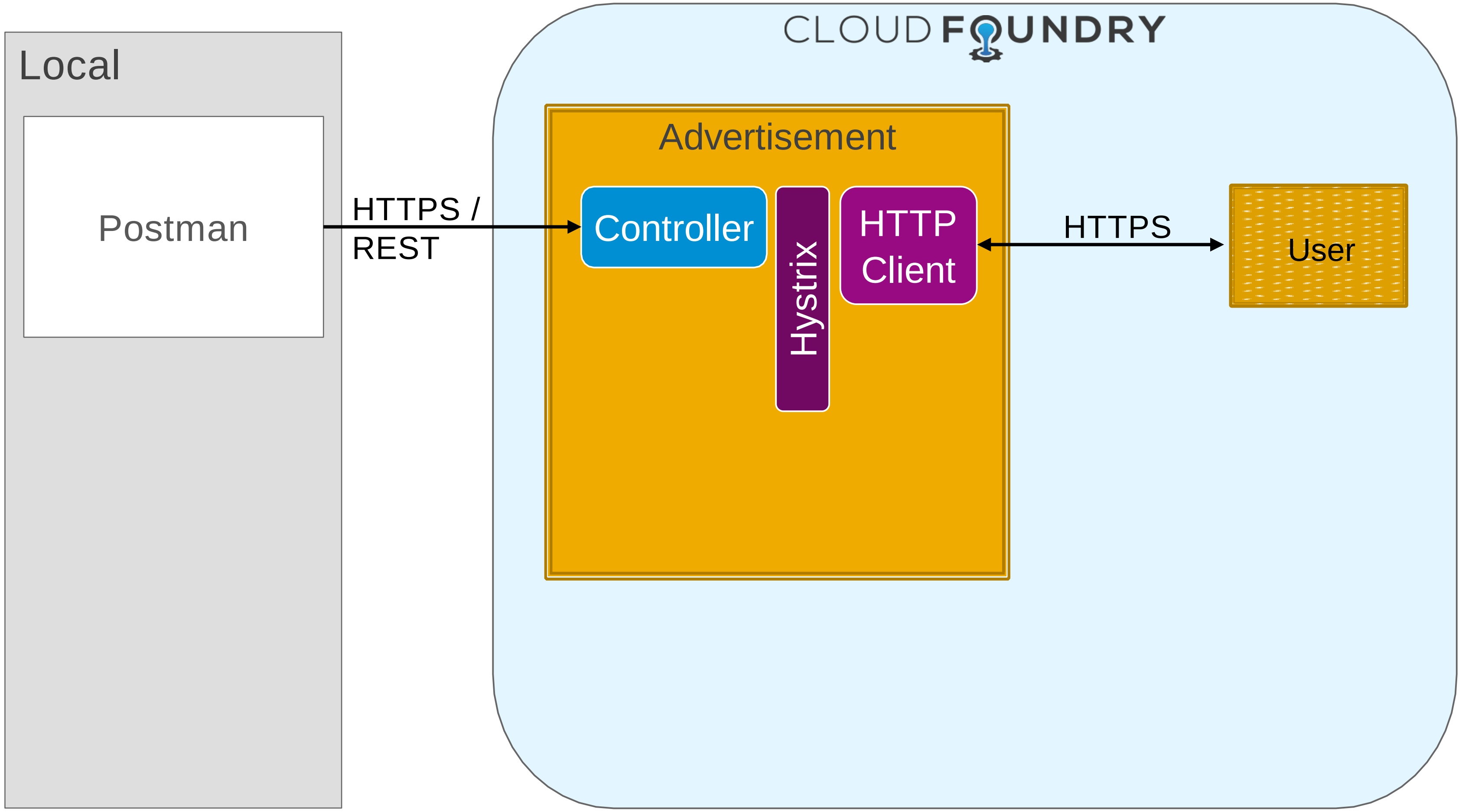
```
Observable<String> observable = new MyCommand().observe();
observable.subscribe( new Observer<String>() {
            public void onError(Throwable e) { /* observed call encounters issue */ }
            public void onNext(String v) { /* observed call emits data */ }
            public void onCompleted() { /* after the  last onNext() call */ }
});
```

mechanism
to process data streams
(out of scope for this course)

# Calling the User Service via Hystrix

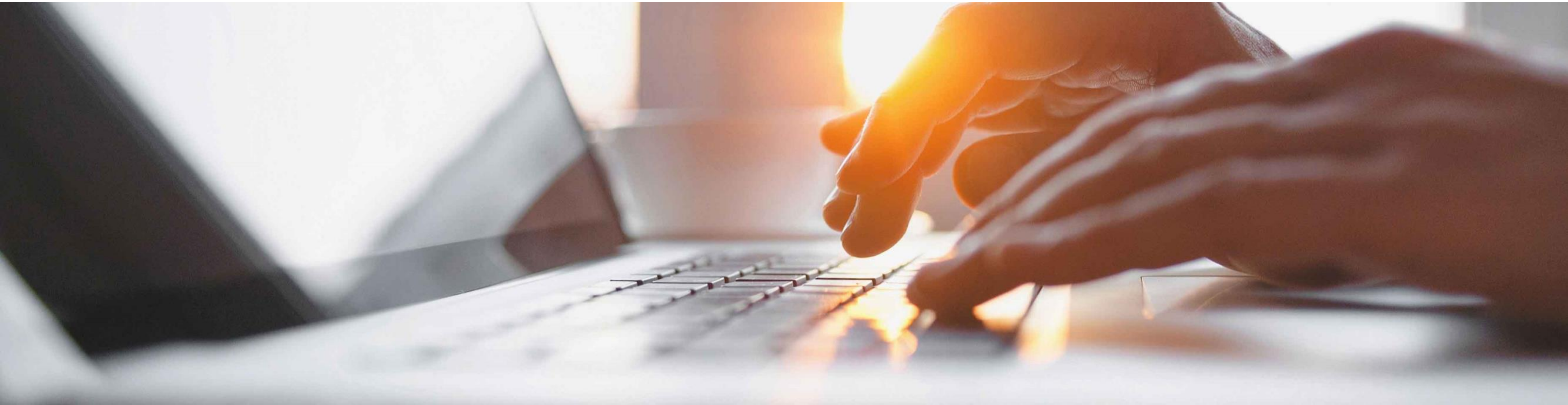
Exercise 17

[Exercise 17:
Introduce Hystrix]



# Calling the User Service via Hystrix

Review of sample solution



# Calling the User Service via Hystrix

Further reading

i Additional Material

- Hystrix Wiki

# Calling the User Service via Hystrix

What you’ve learned in this unit

- Challenges in service-to-service communication
- What resilience is
- Hystrix
  - What it is
  - Why we use it
  - How to use it
- How to call the user service via Hystrix

# Thank you.

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