Rethinking REST in a Microservices World

James Roper

@jroper

Agenda

- What is asynchronous communication?
- Asynchronous vs synchronous architectures
- Asynchronous communication in practice

Asynchronous communication

Asynchronous communication

- Not asynchronous IO

Asynchronous communication

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  - Asynchronous IO is good…

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  - Responses are handled via callbacks

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CompletionStage<Response> futureResponse = makeRequest();

CompletionStage<MyModel> futureModel =
  futureResponse.thenApply(response -> {
    MyModel model = decode(response.getBody());
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  });
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  - Callback only takes a thread when it's executed

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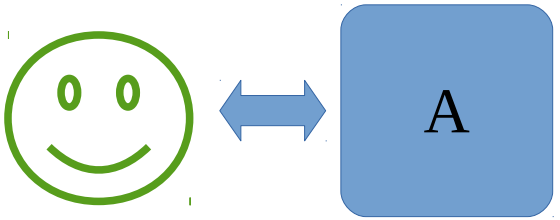
  - Asynchronous IO is about not blocking threads
- Async communication is not blocking requests
  - A service processing a request shouldn't block on another service

Synchronous communication

Synchronous communication



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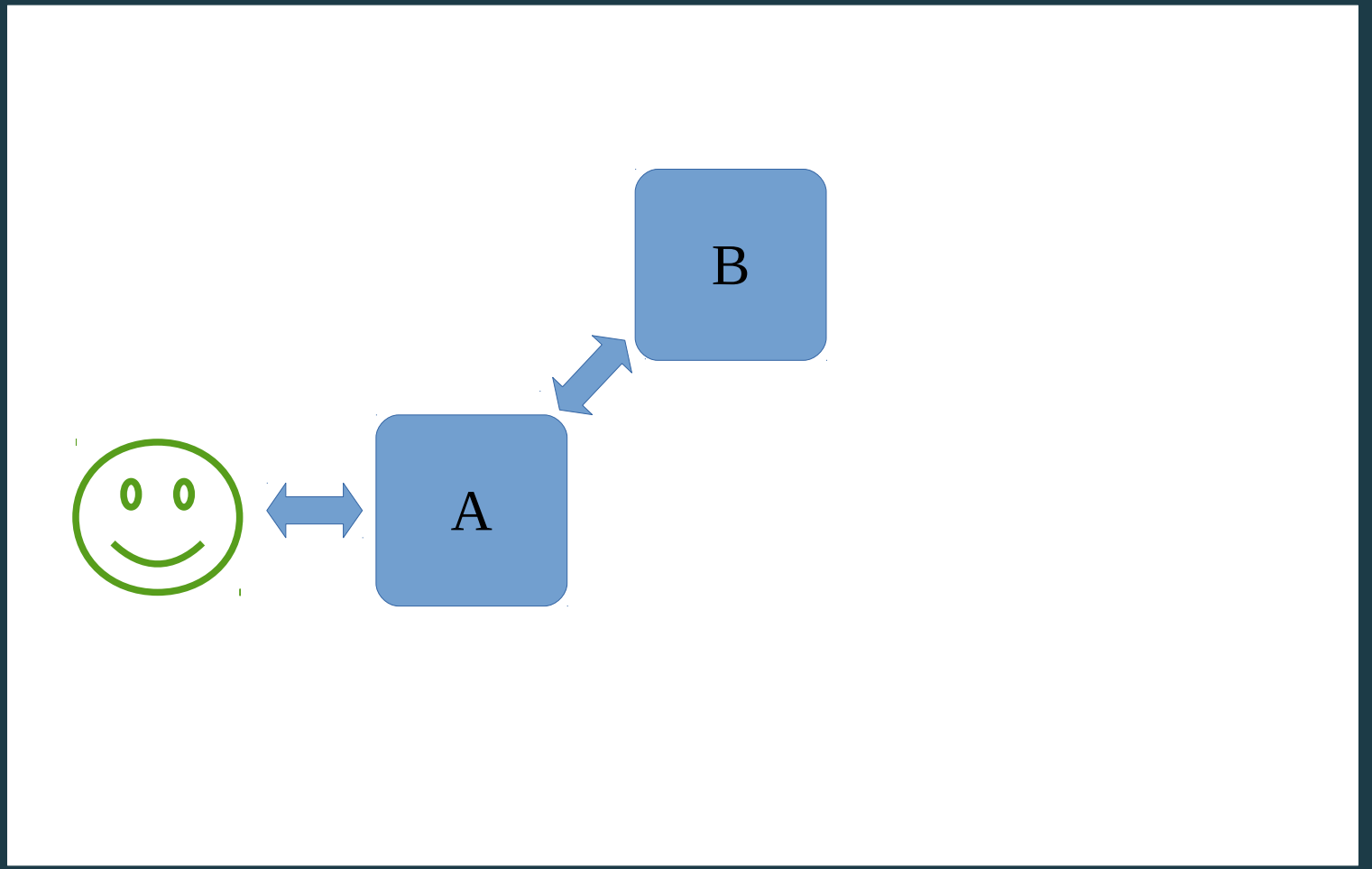

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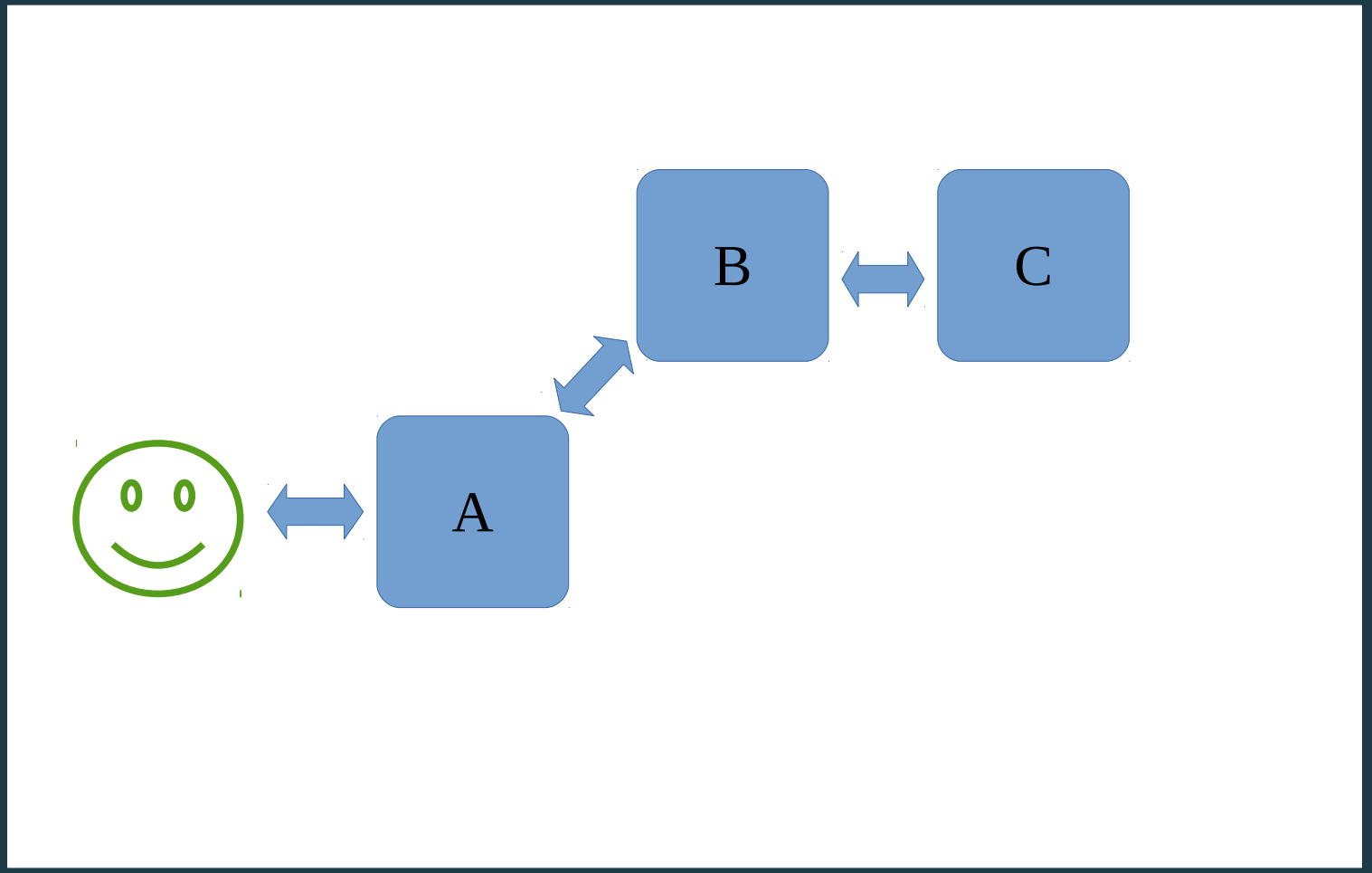

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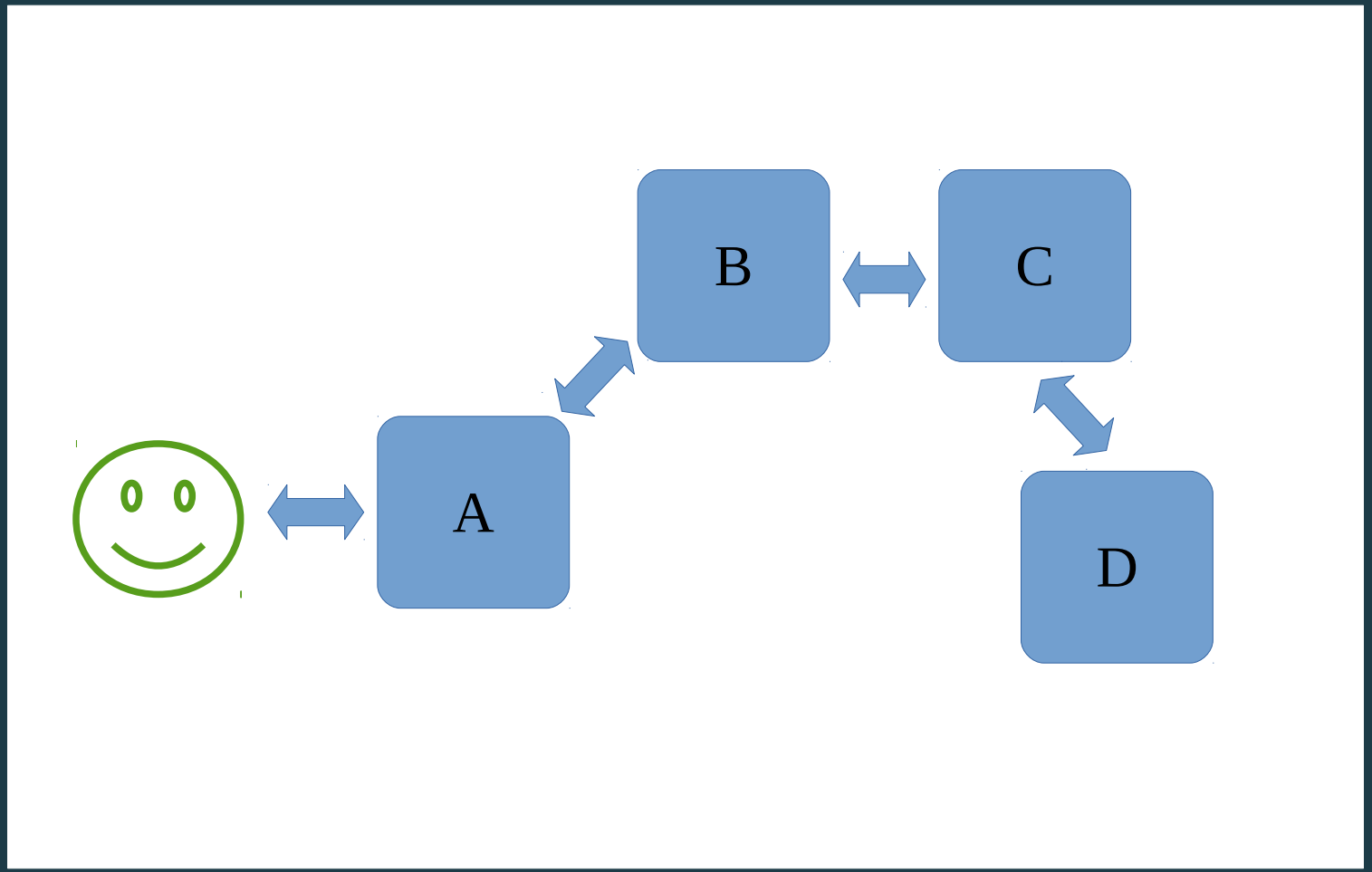

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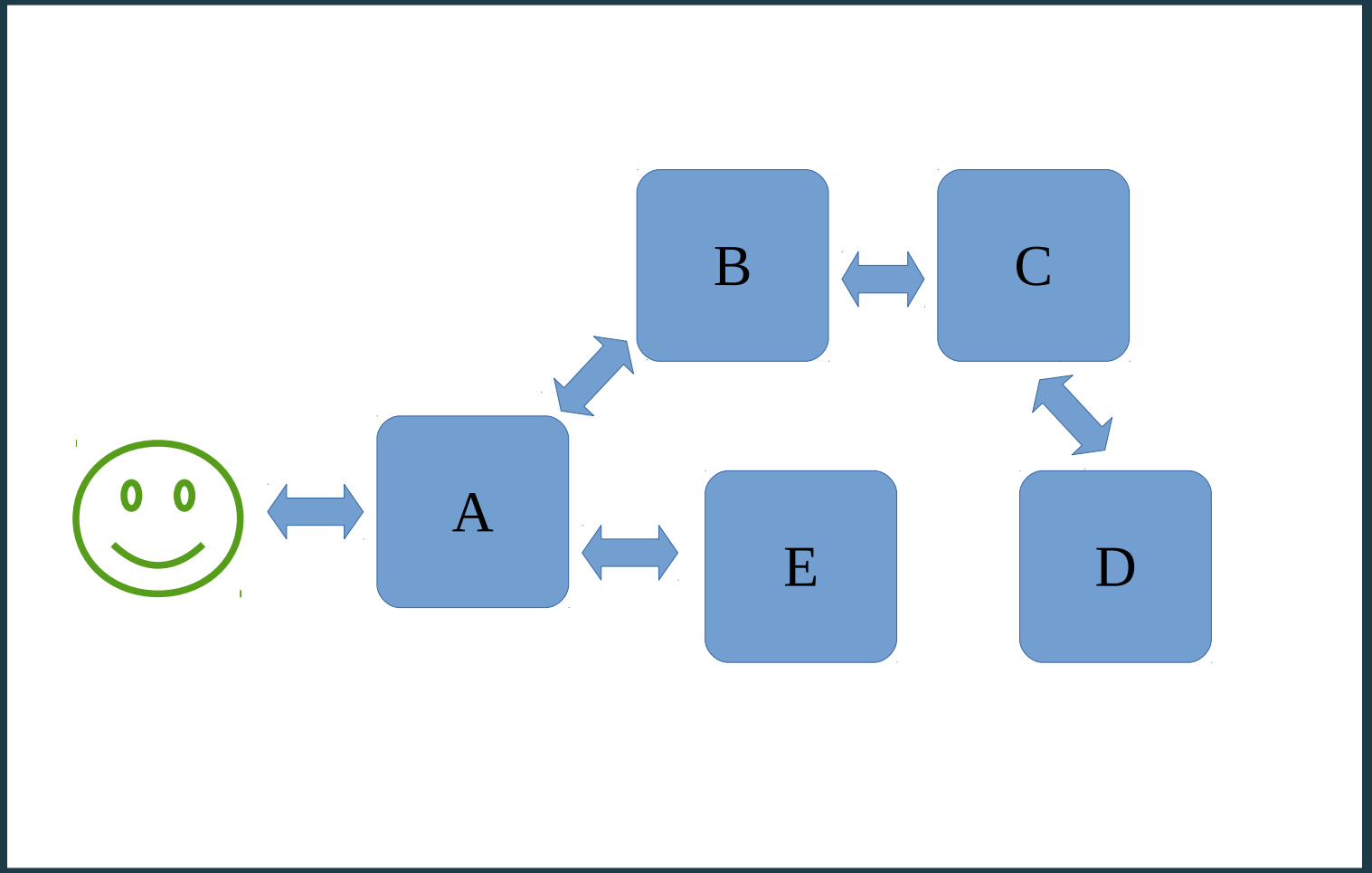

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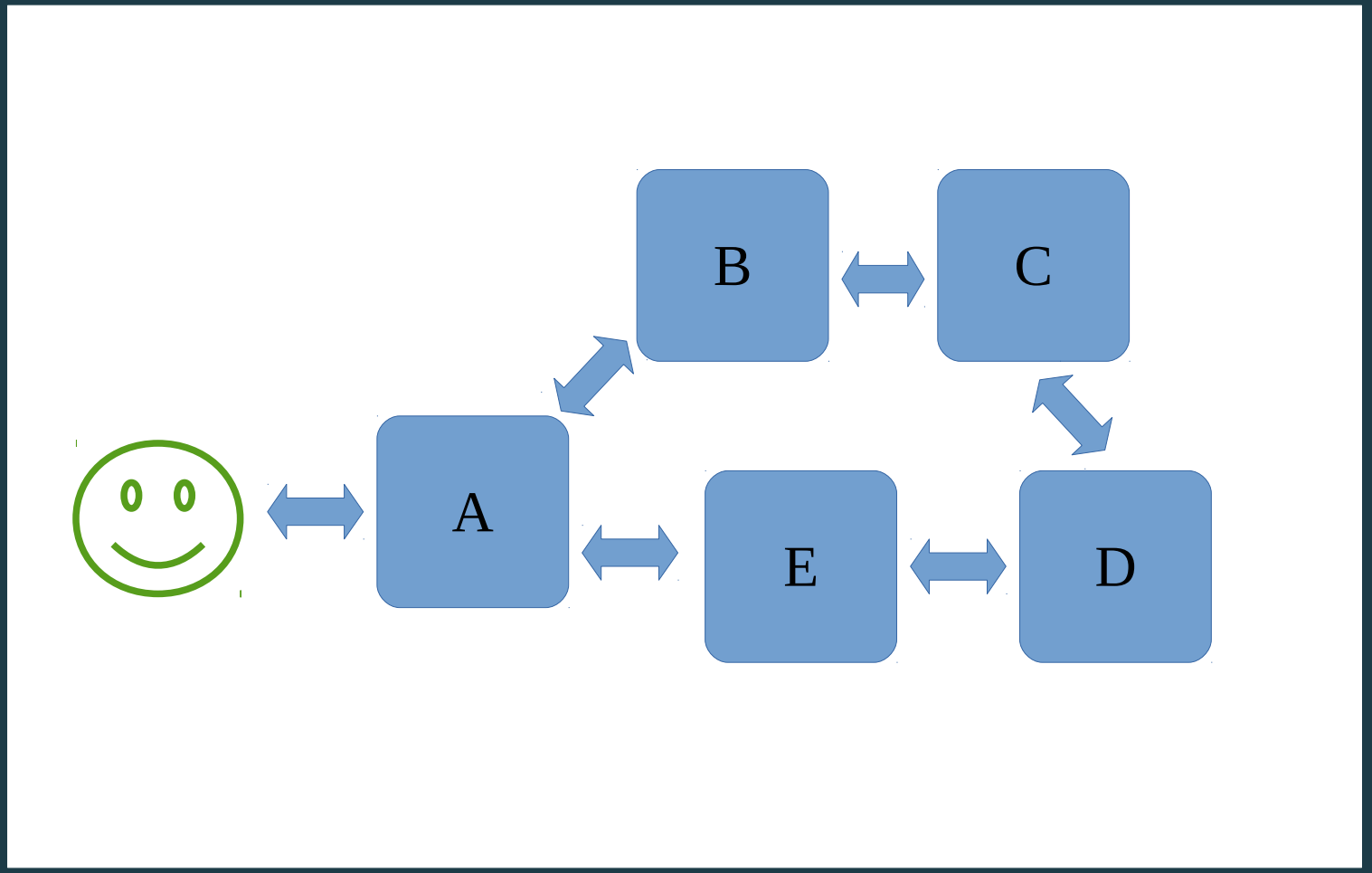

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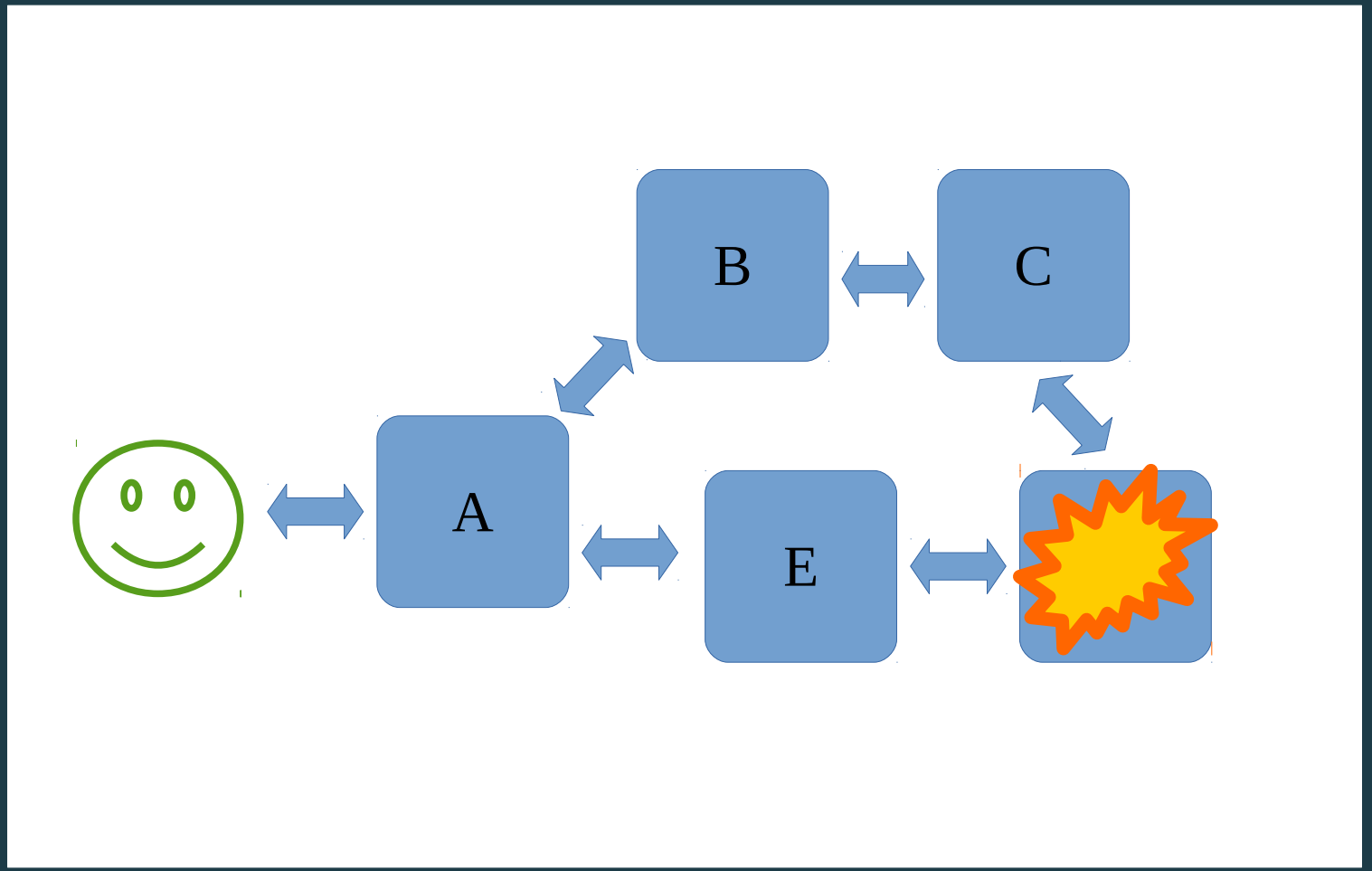

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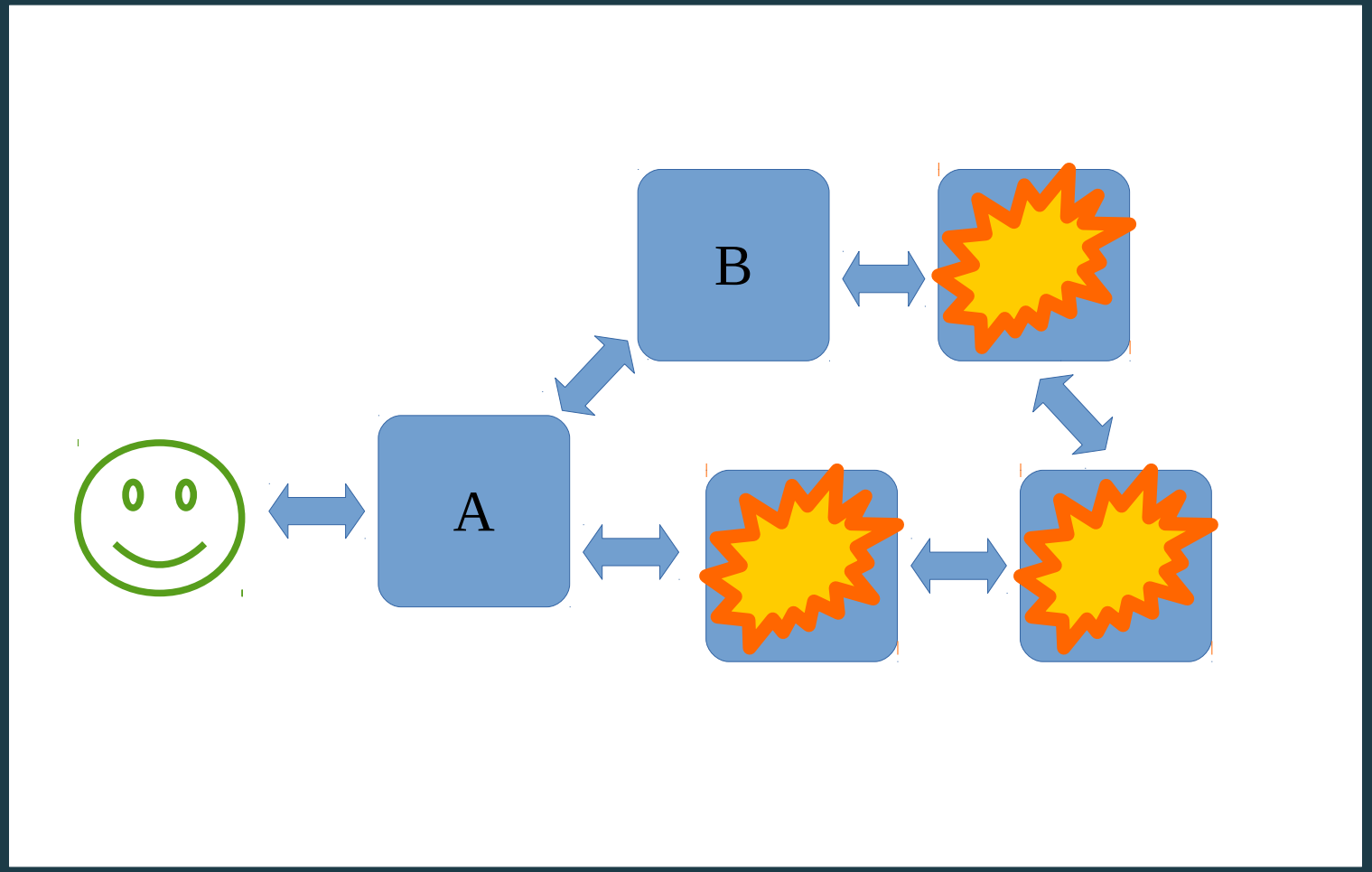

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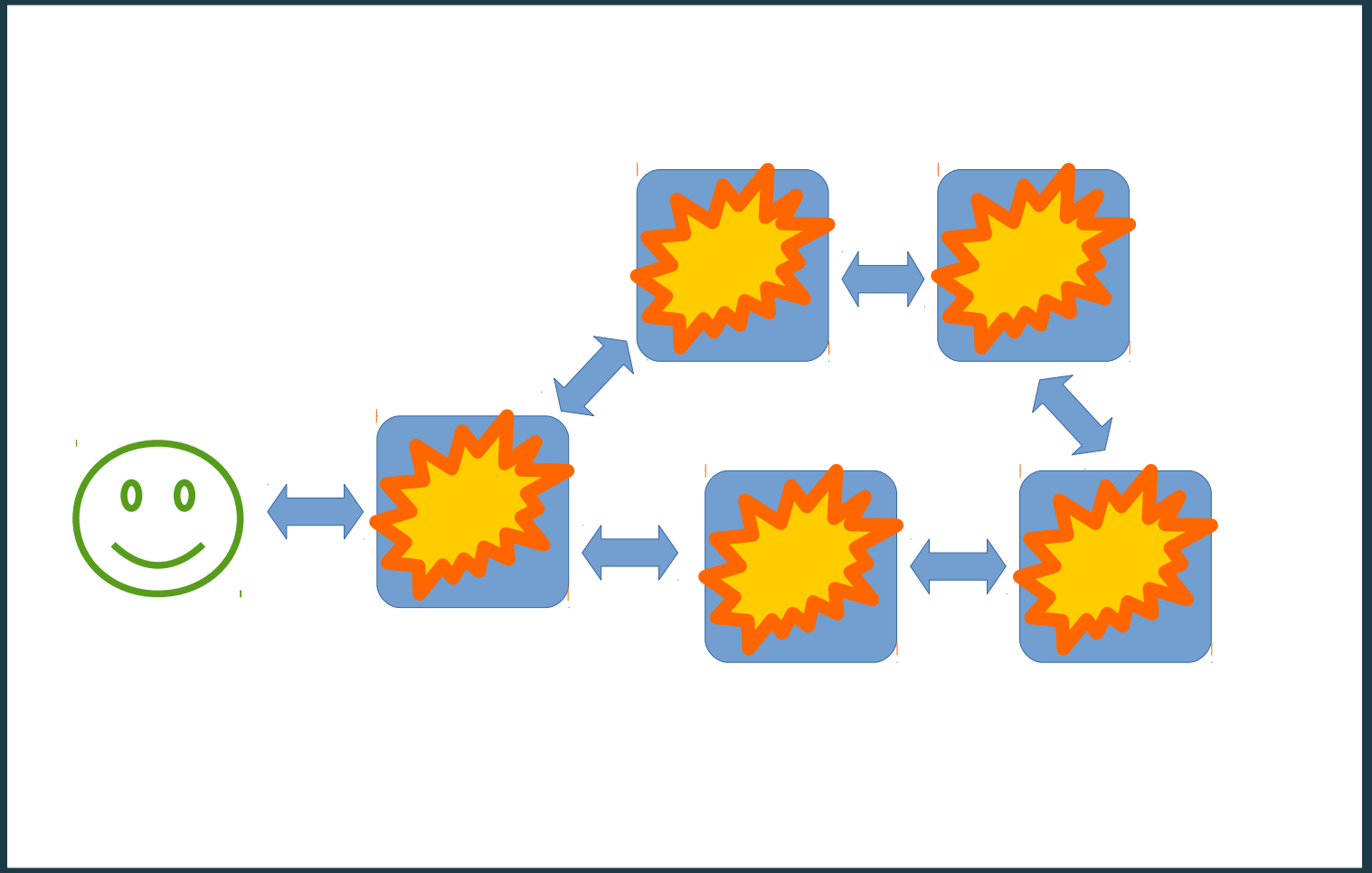

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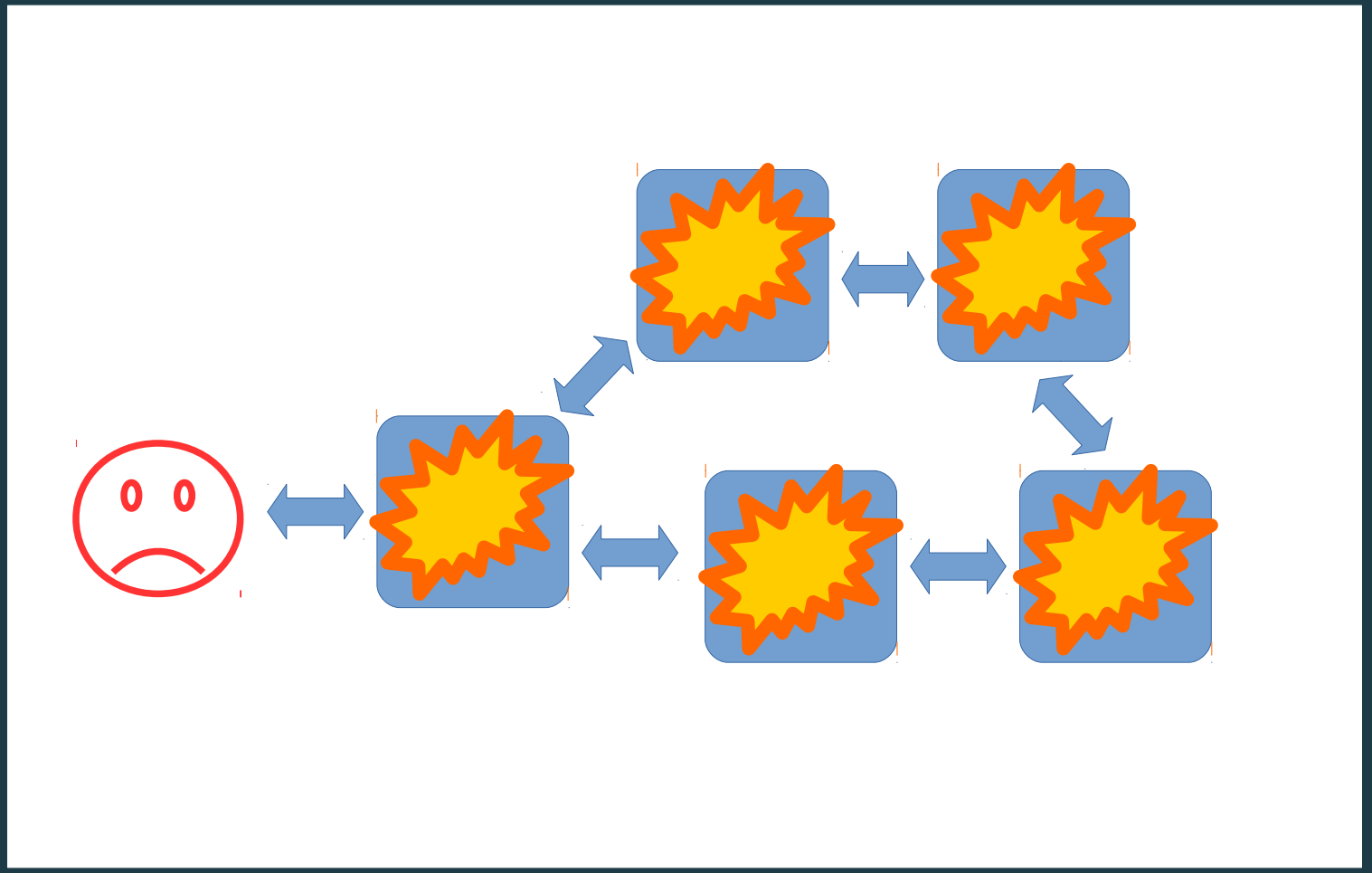

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- Often whole system needs to be up to serve any request

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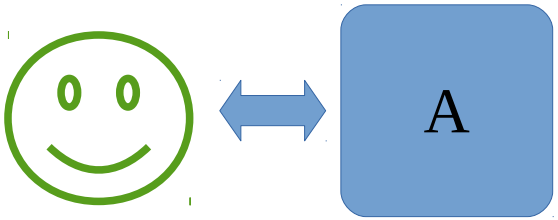

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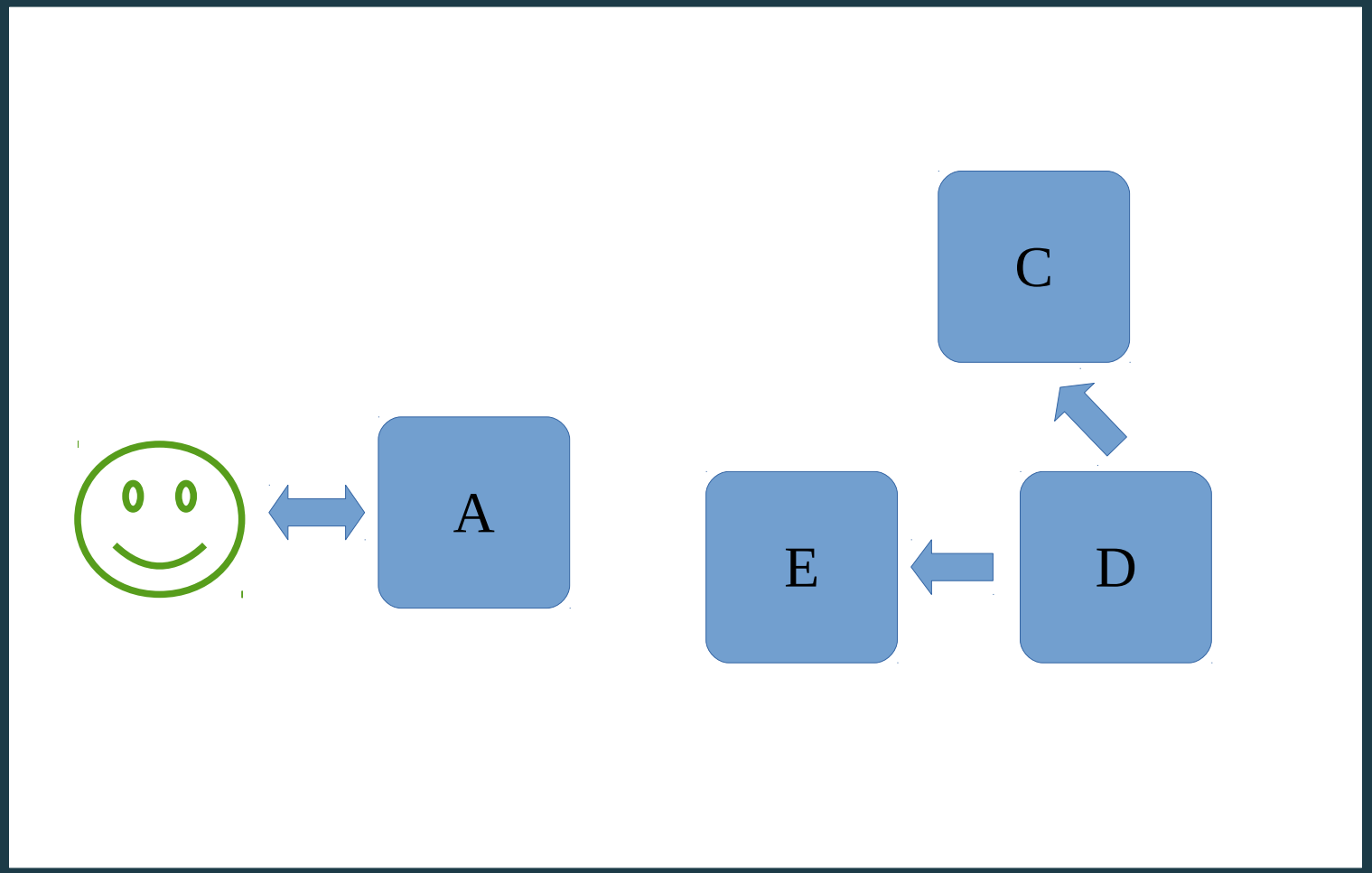

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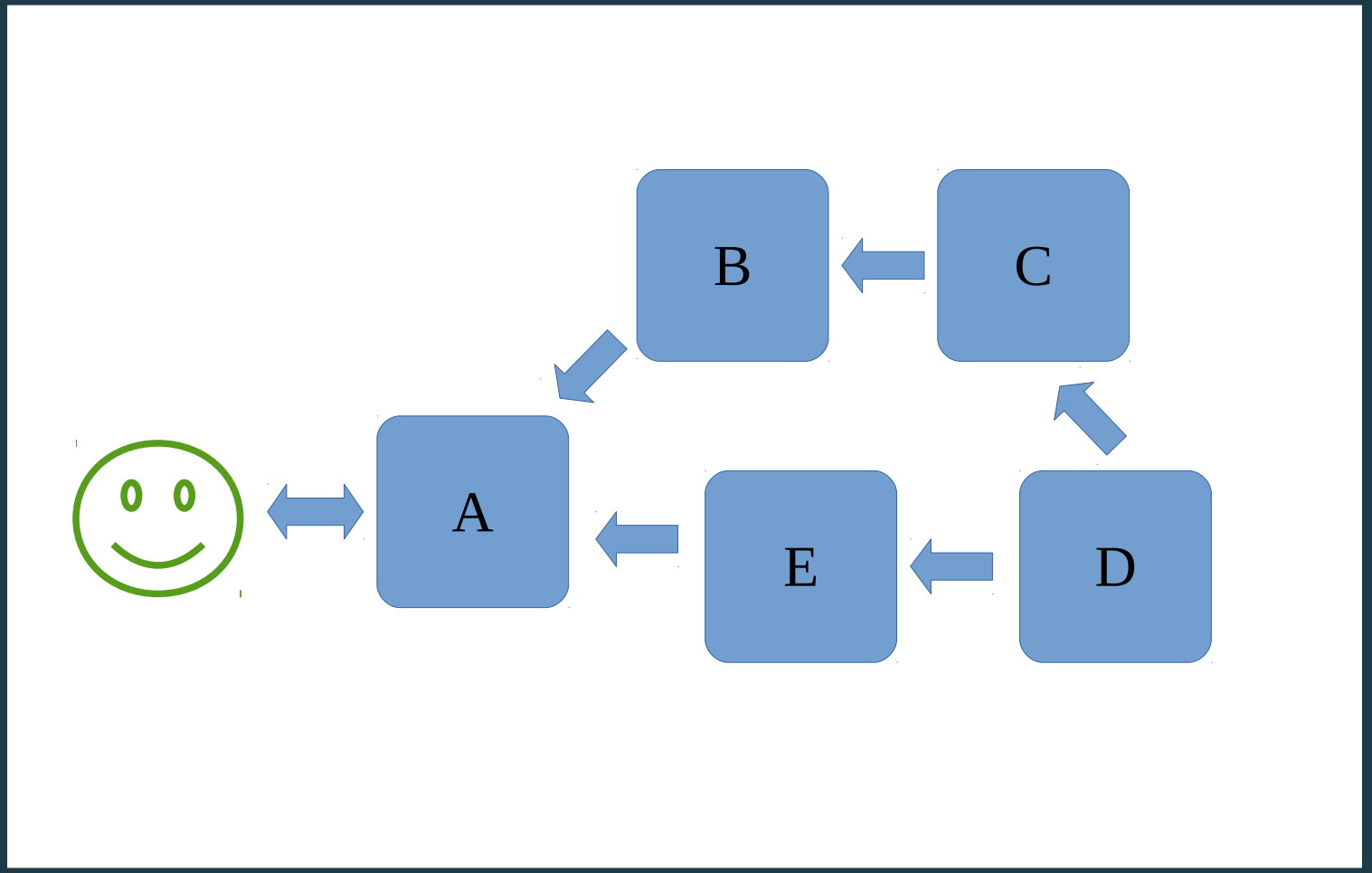

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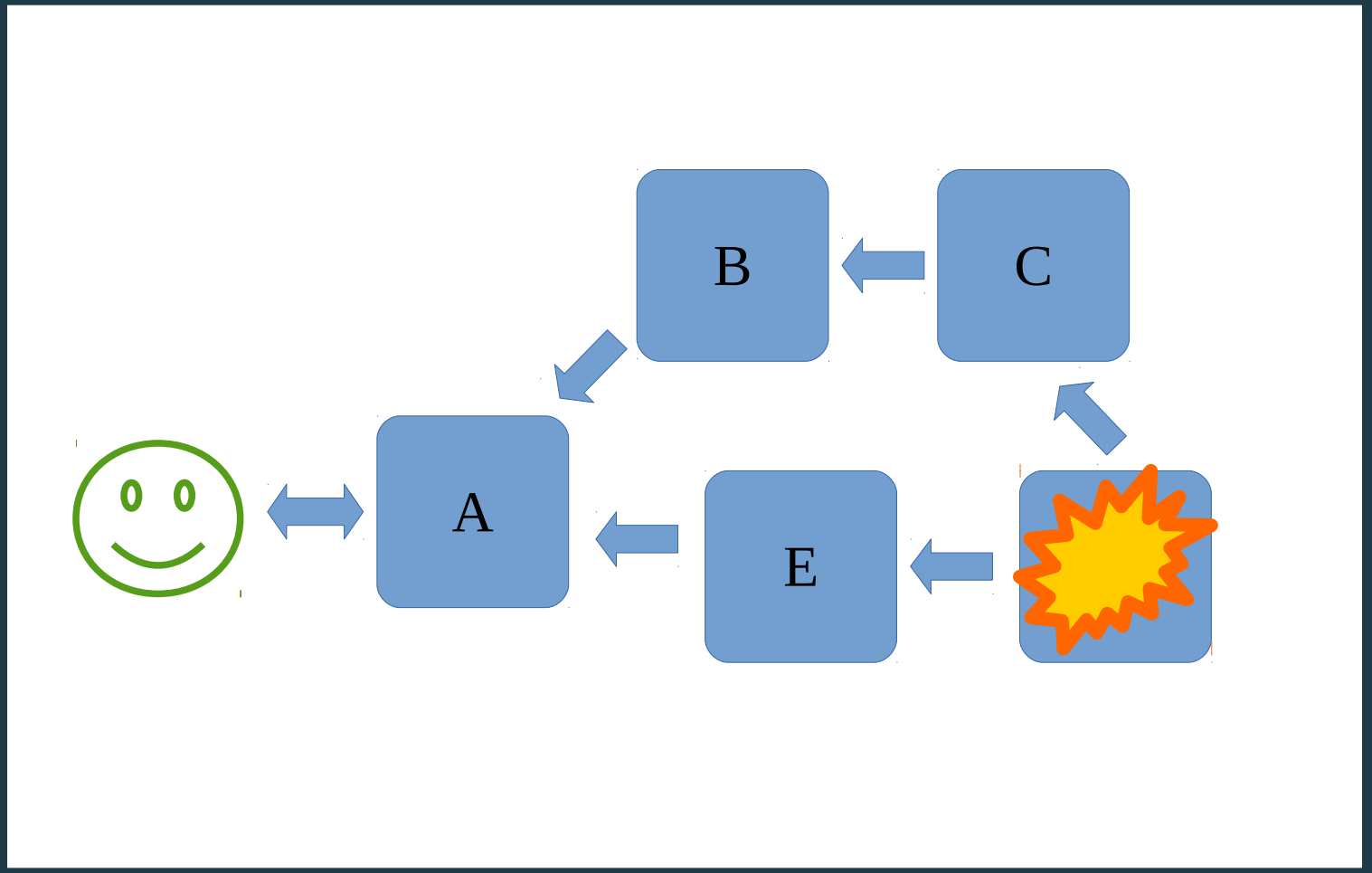

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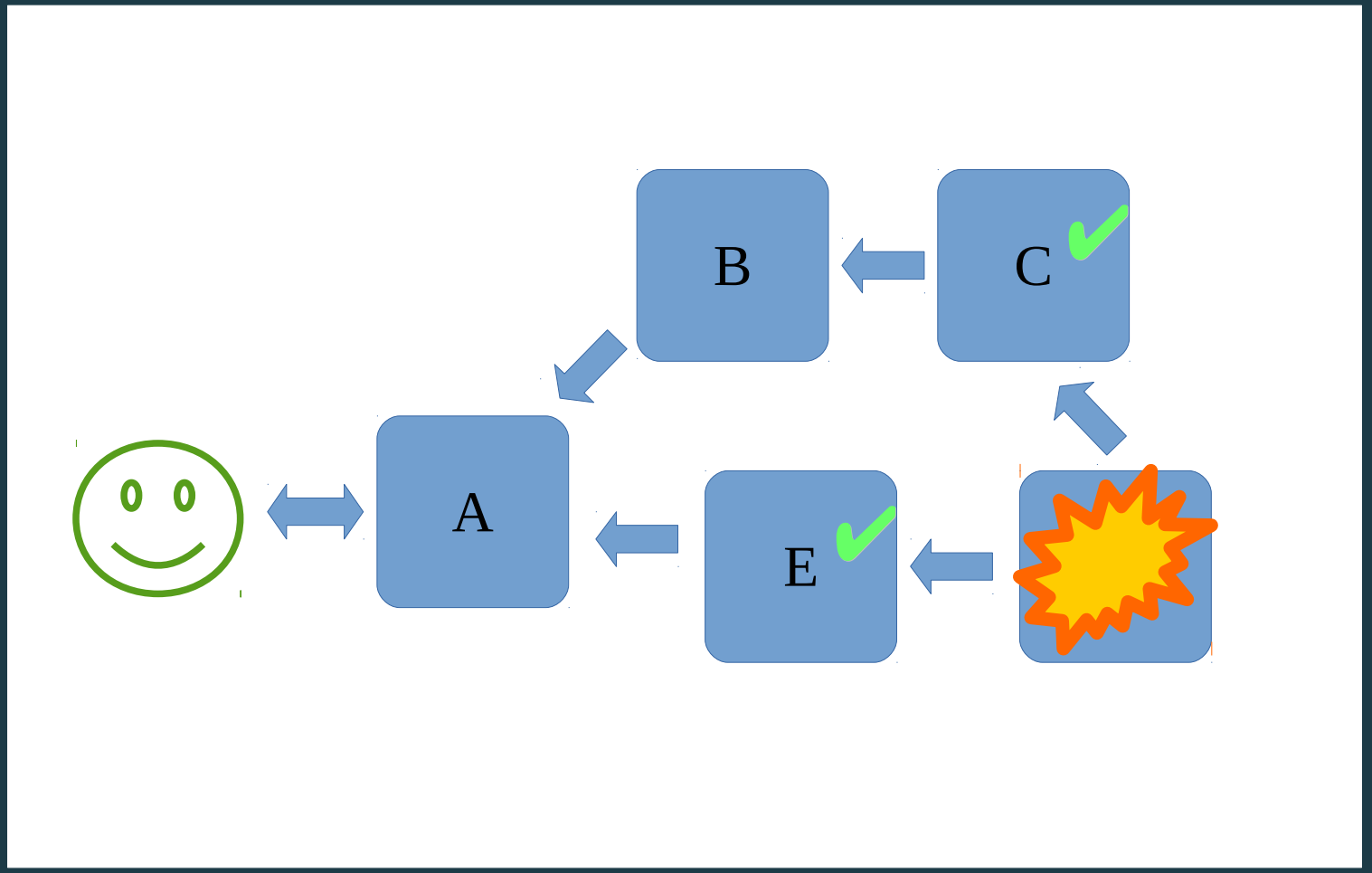

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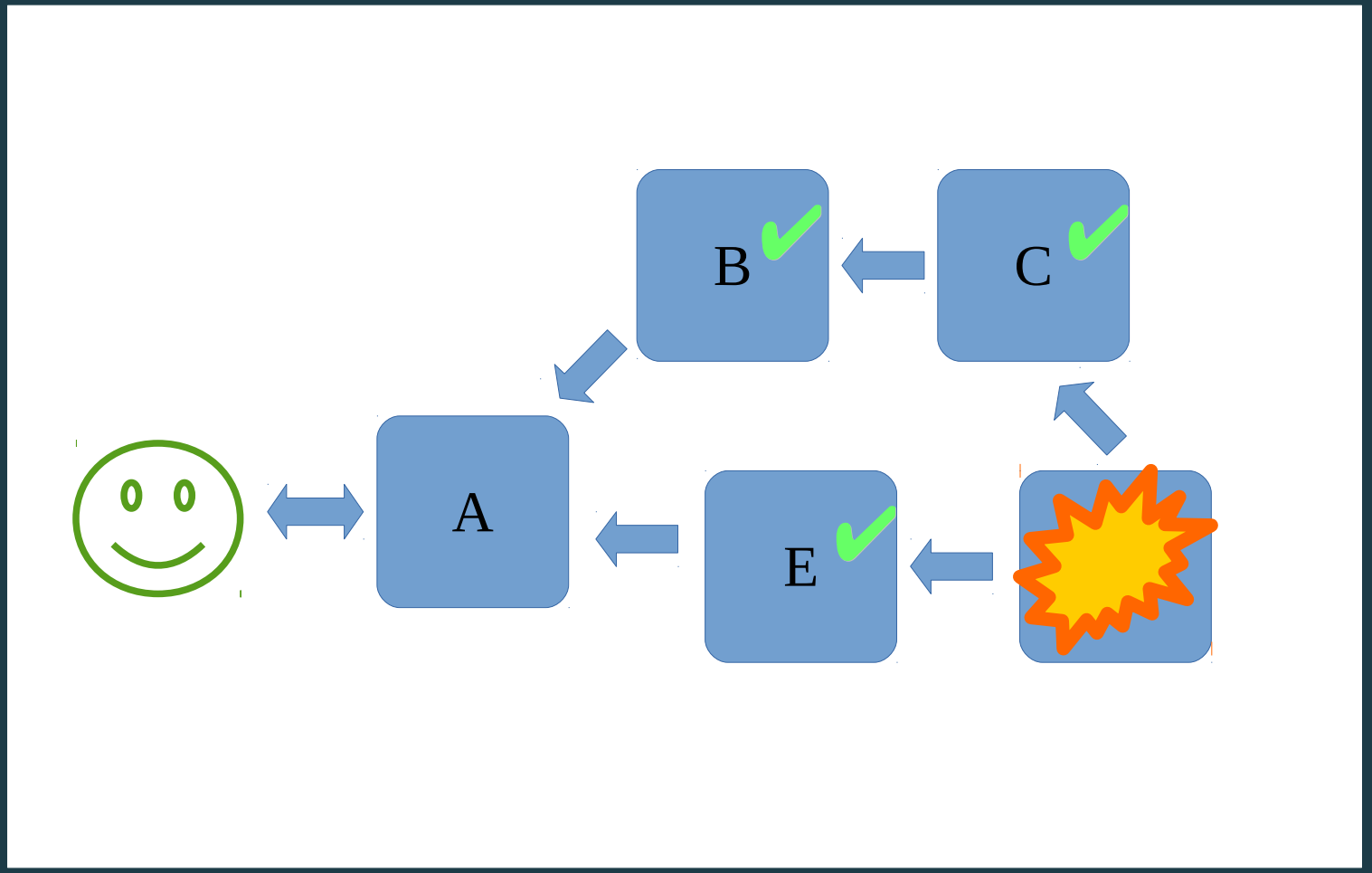

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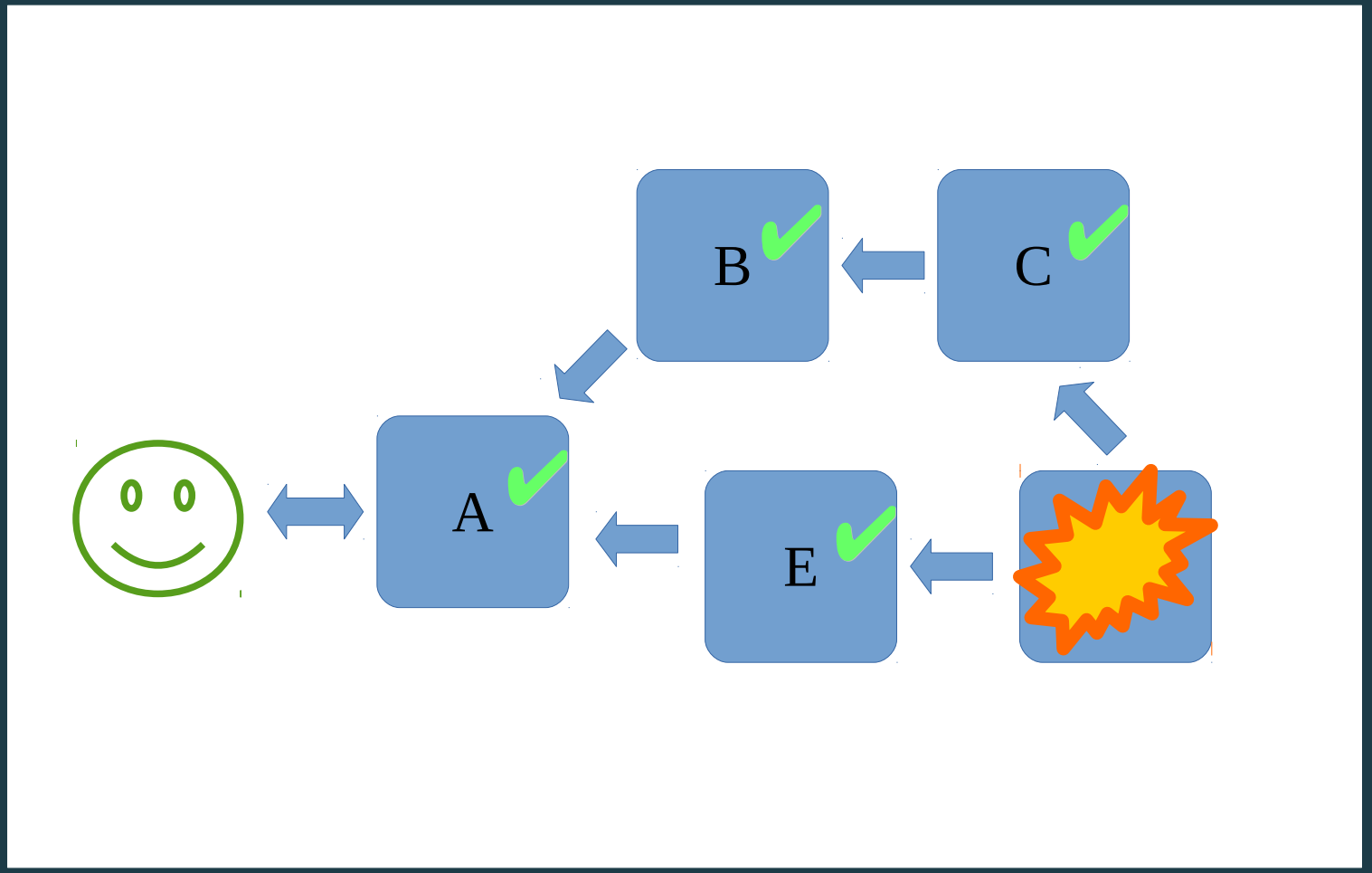

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- Components are isolated

REST

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  - But...

Danger!

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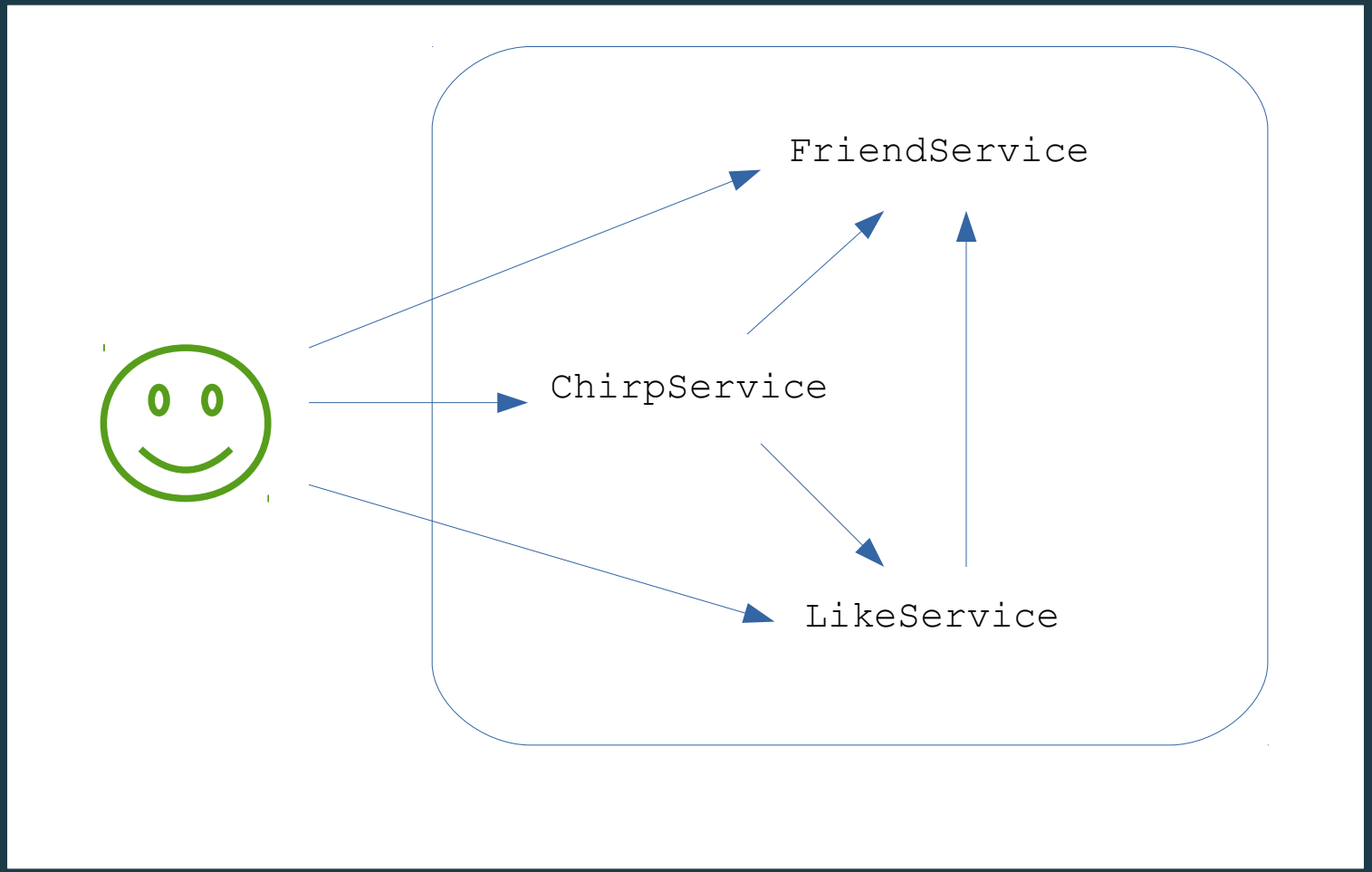
Danger!

- We have a monolith called Chirper
- Monoliths are bad!
- Let's convert to microservices

Chirper monolith



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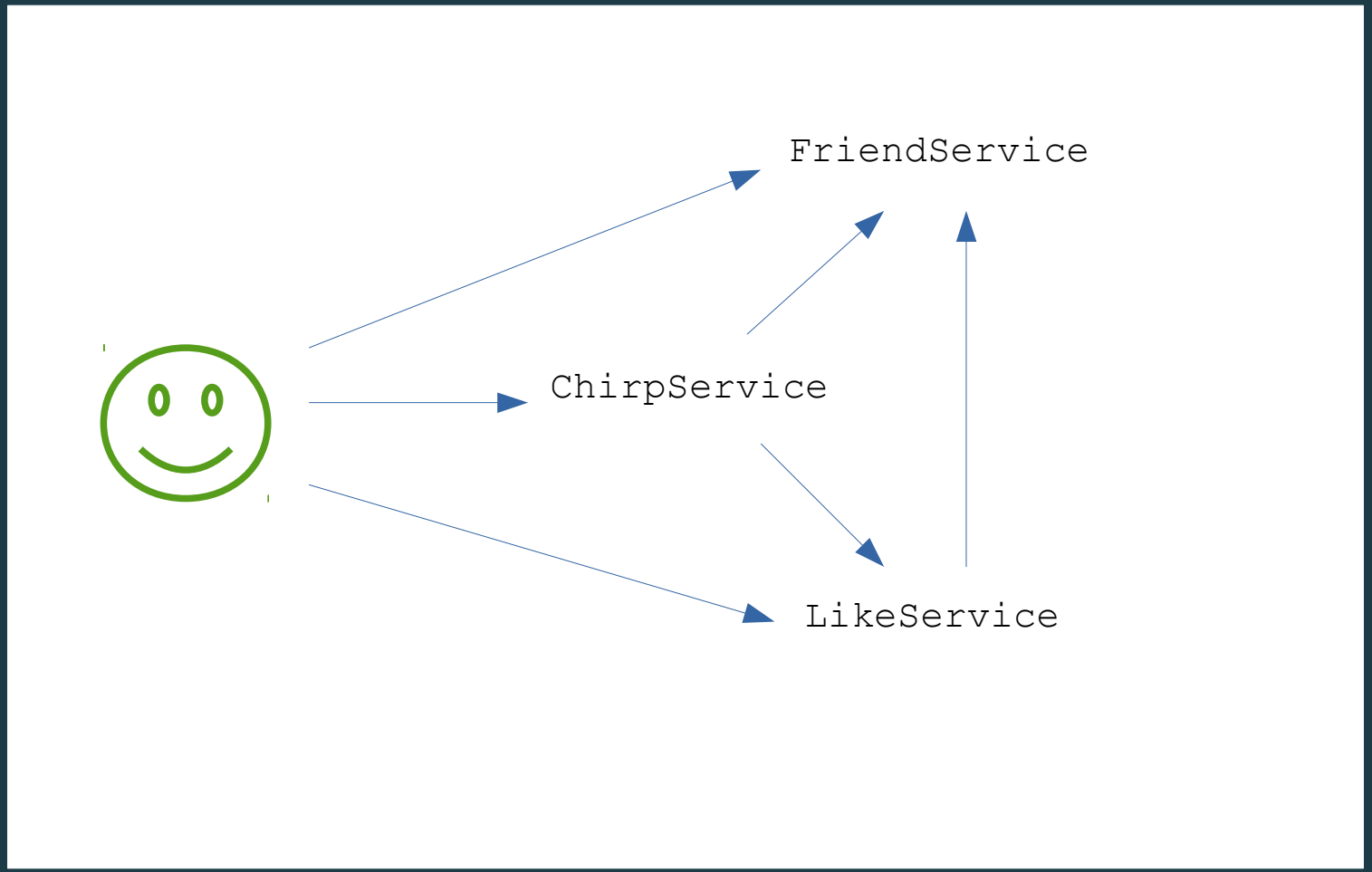

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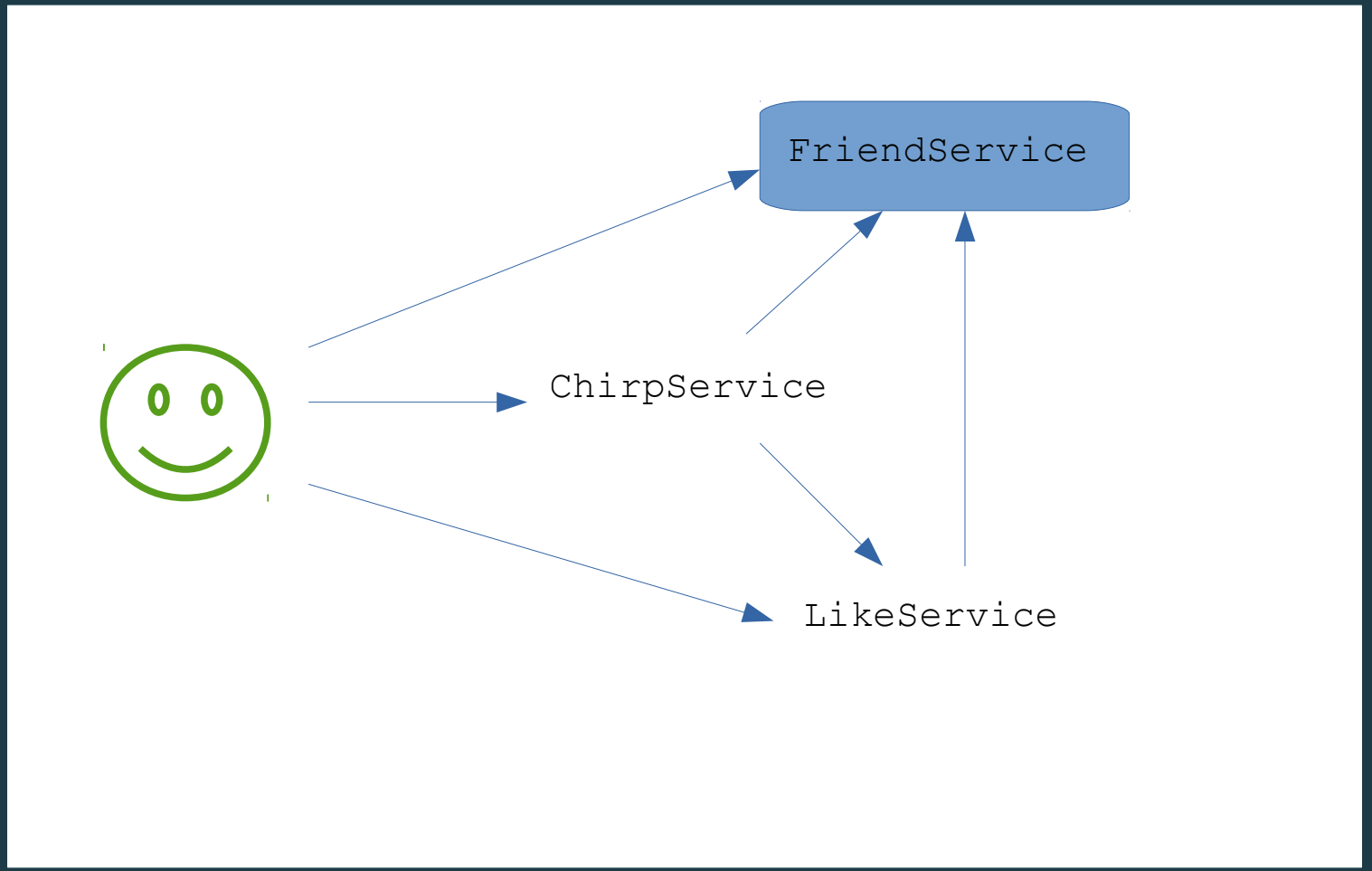

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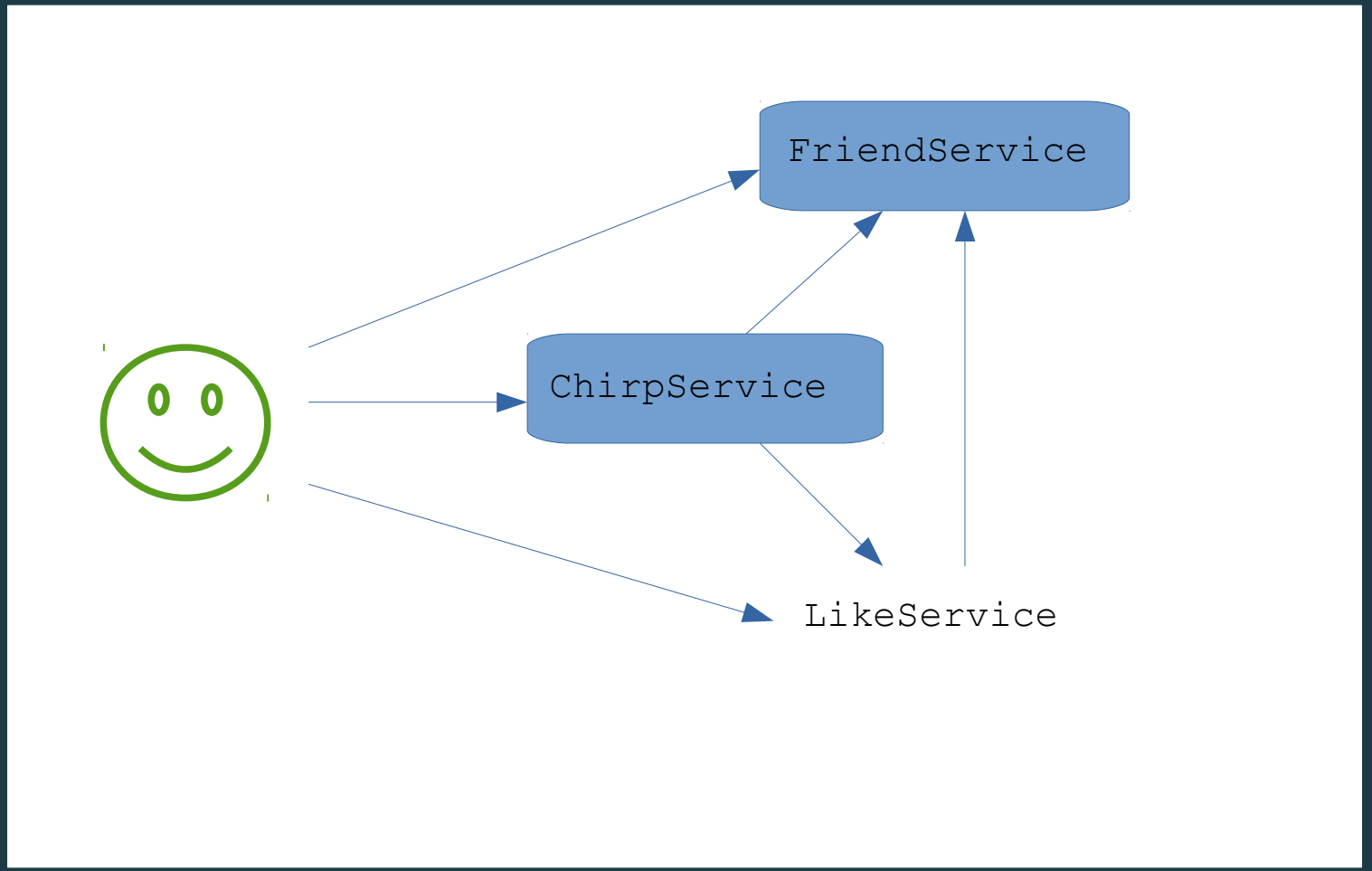

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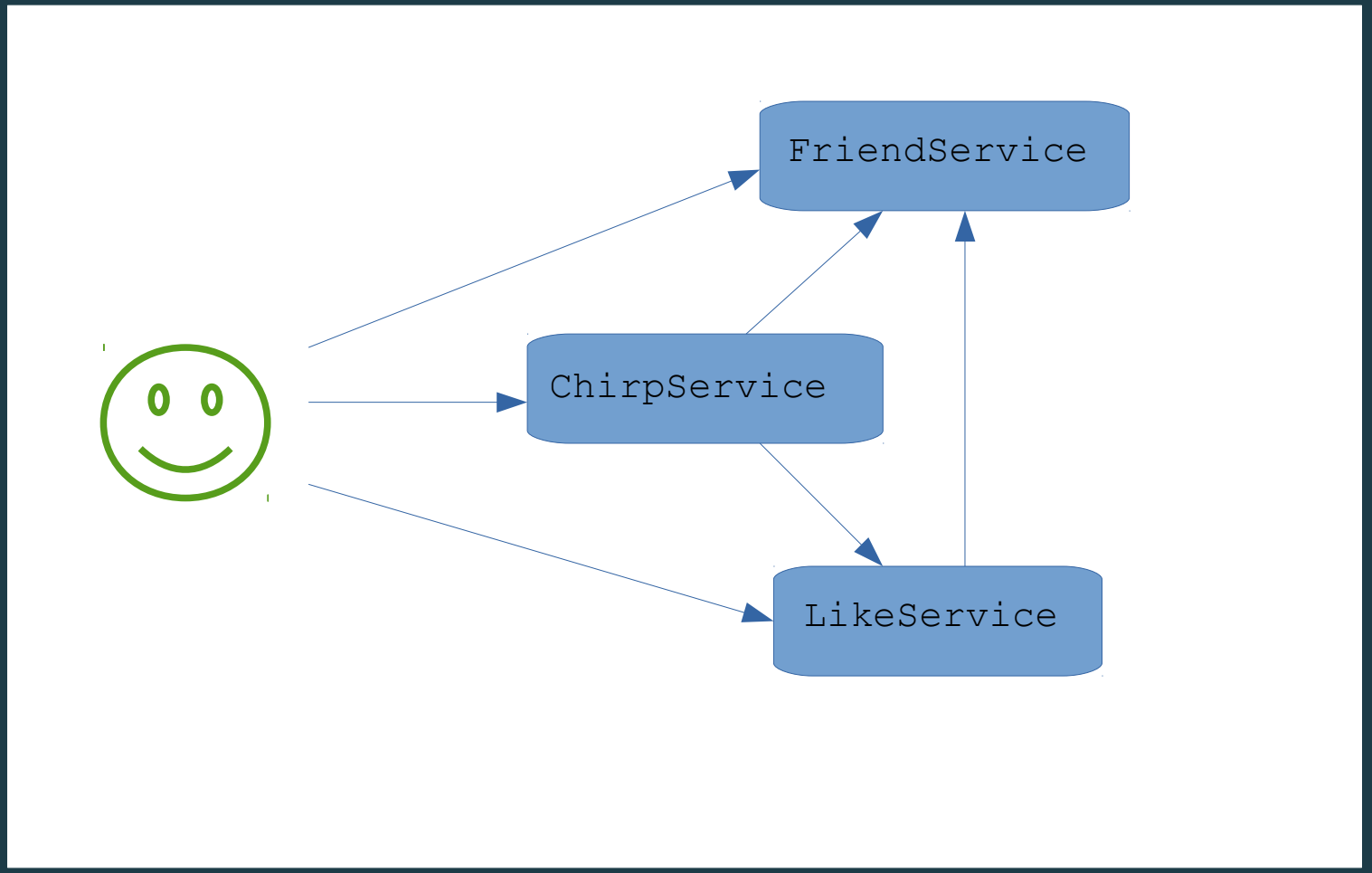

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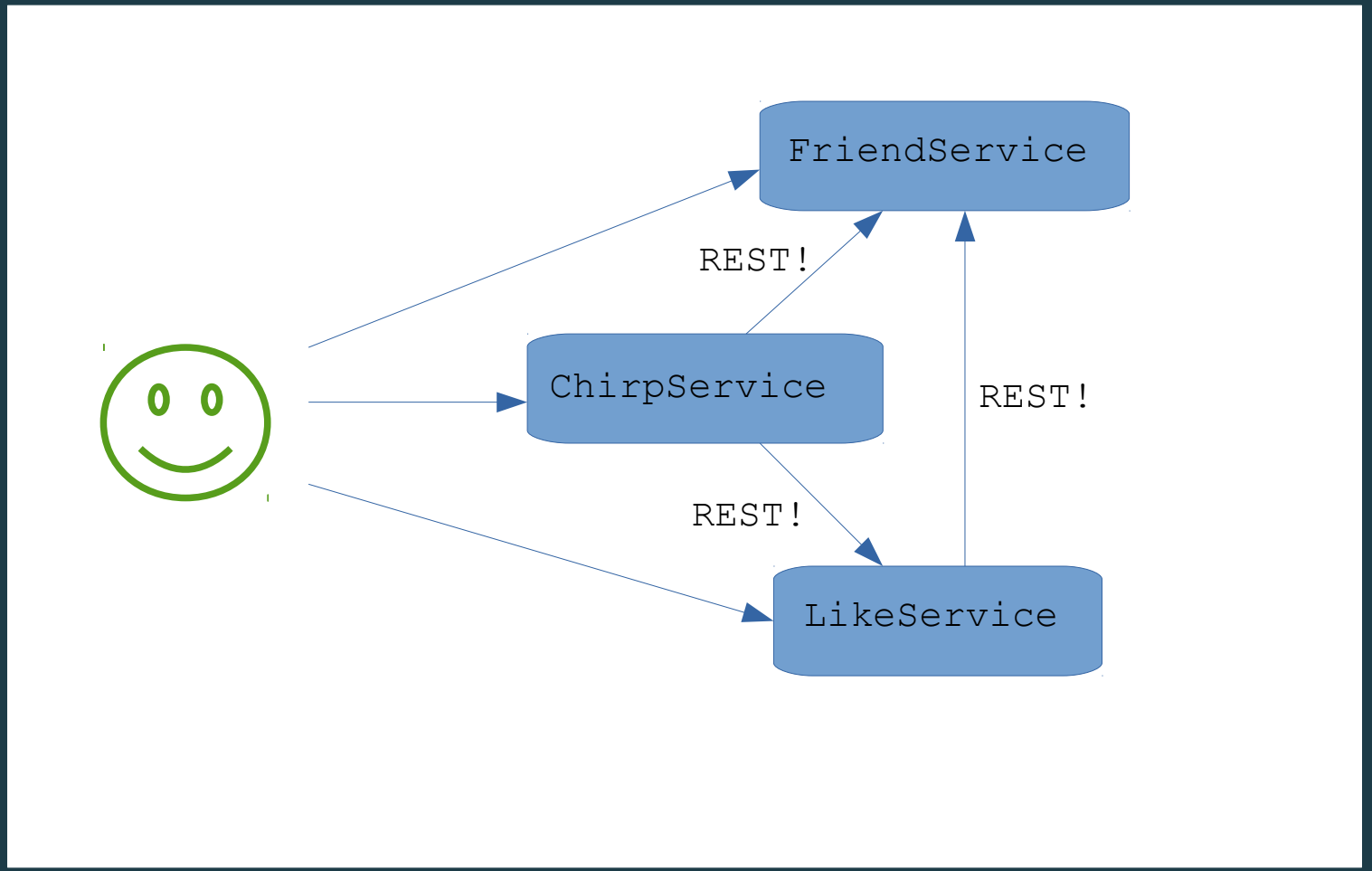

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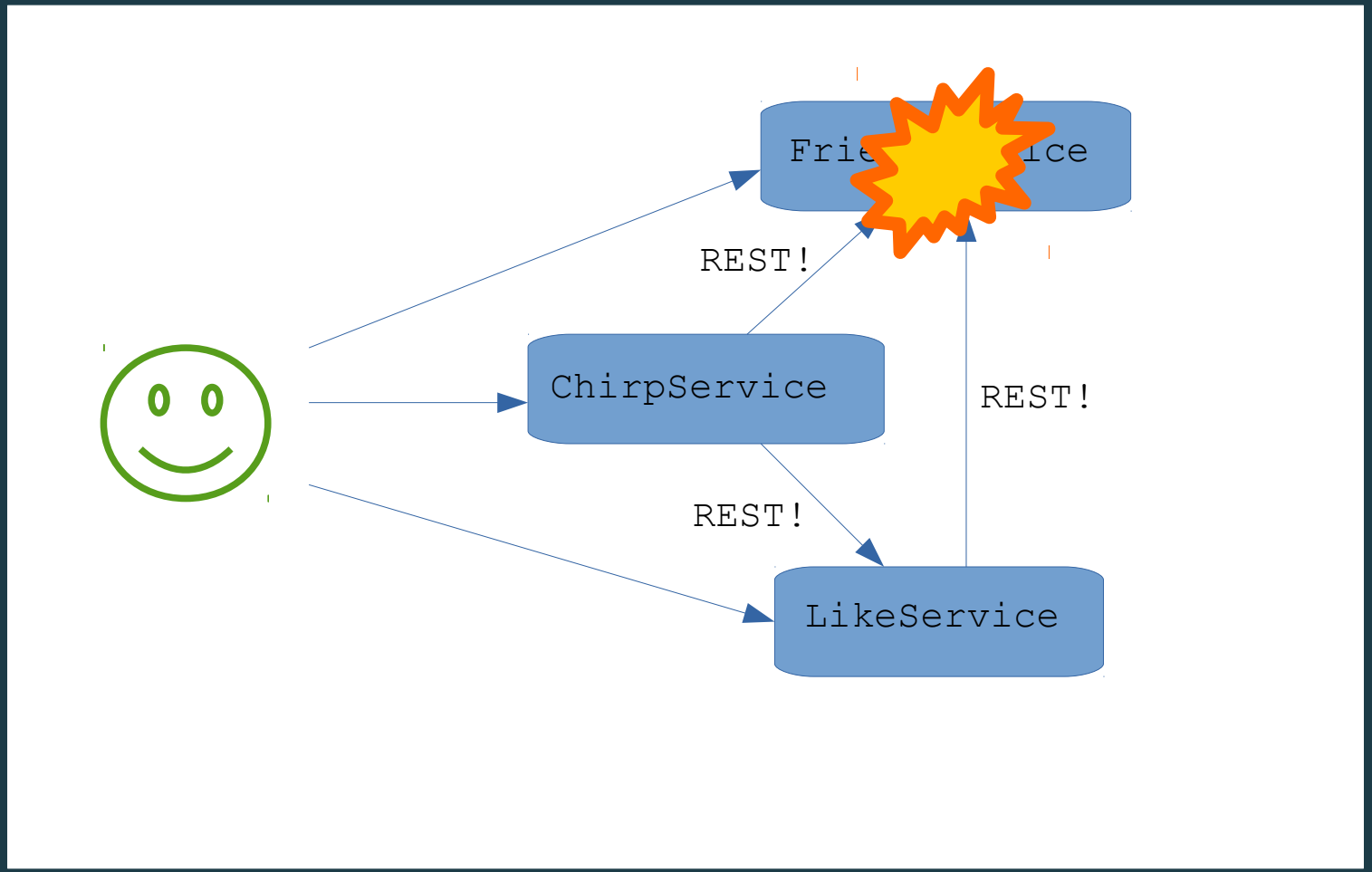

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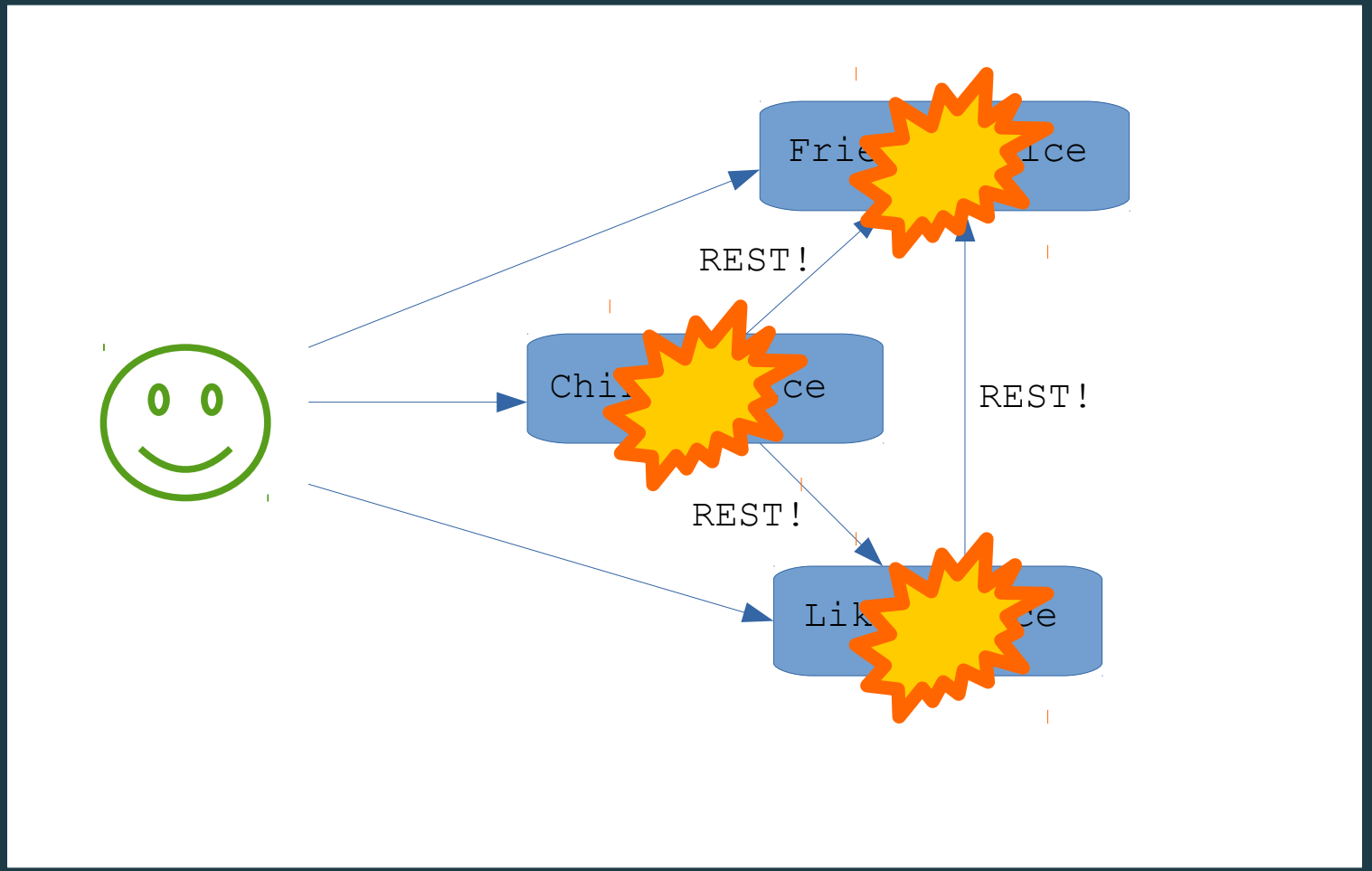

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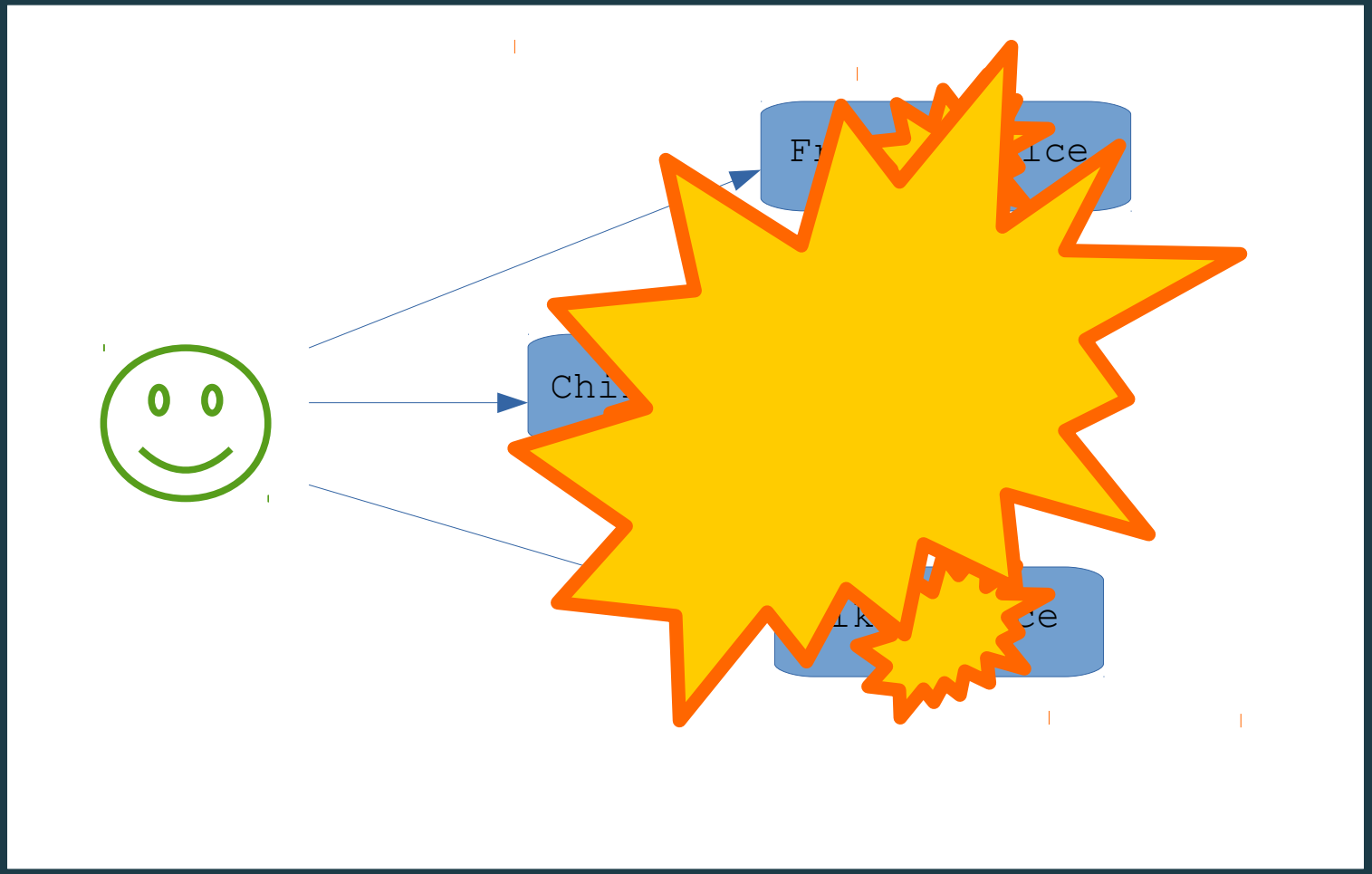

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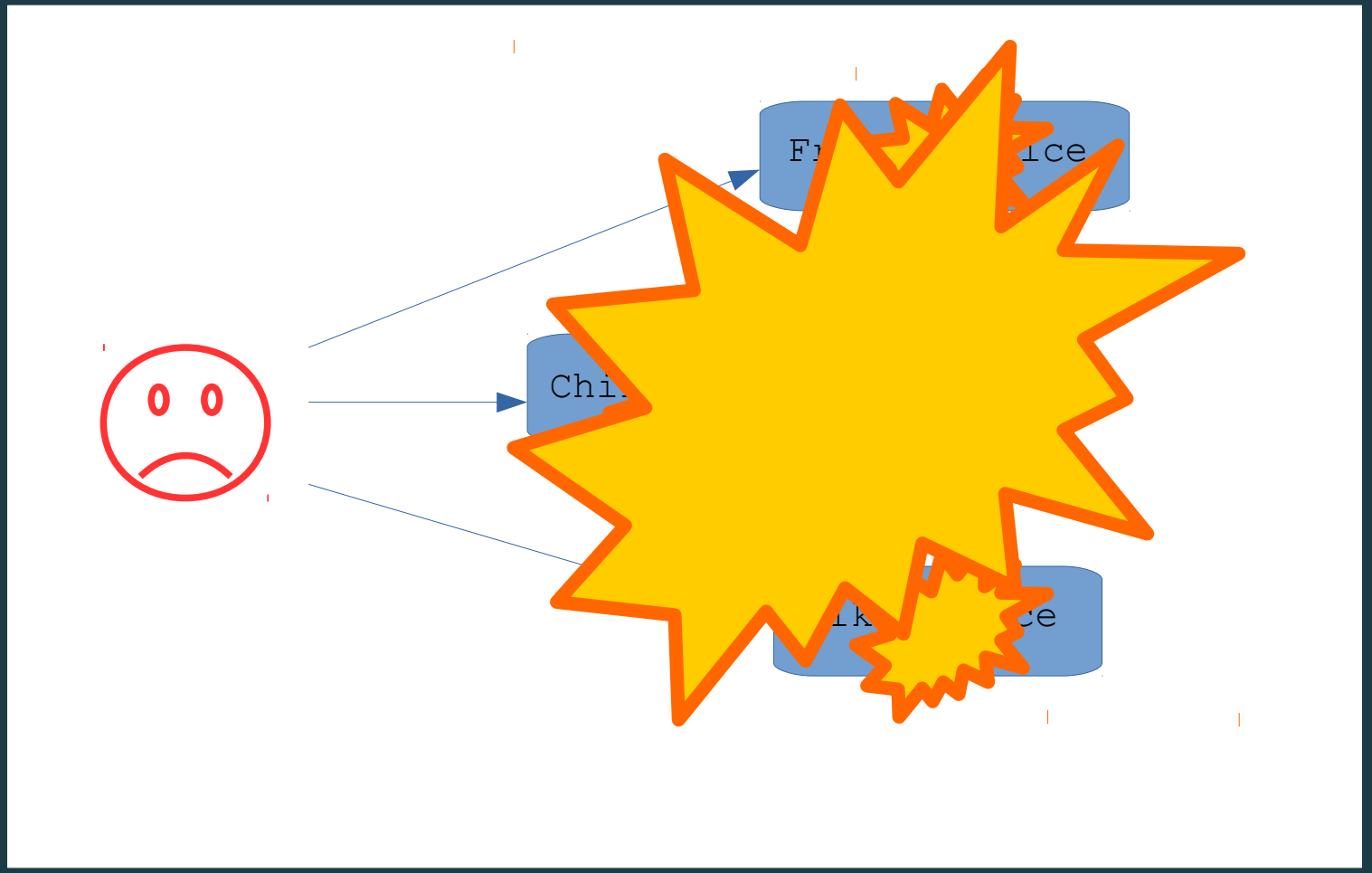

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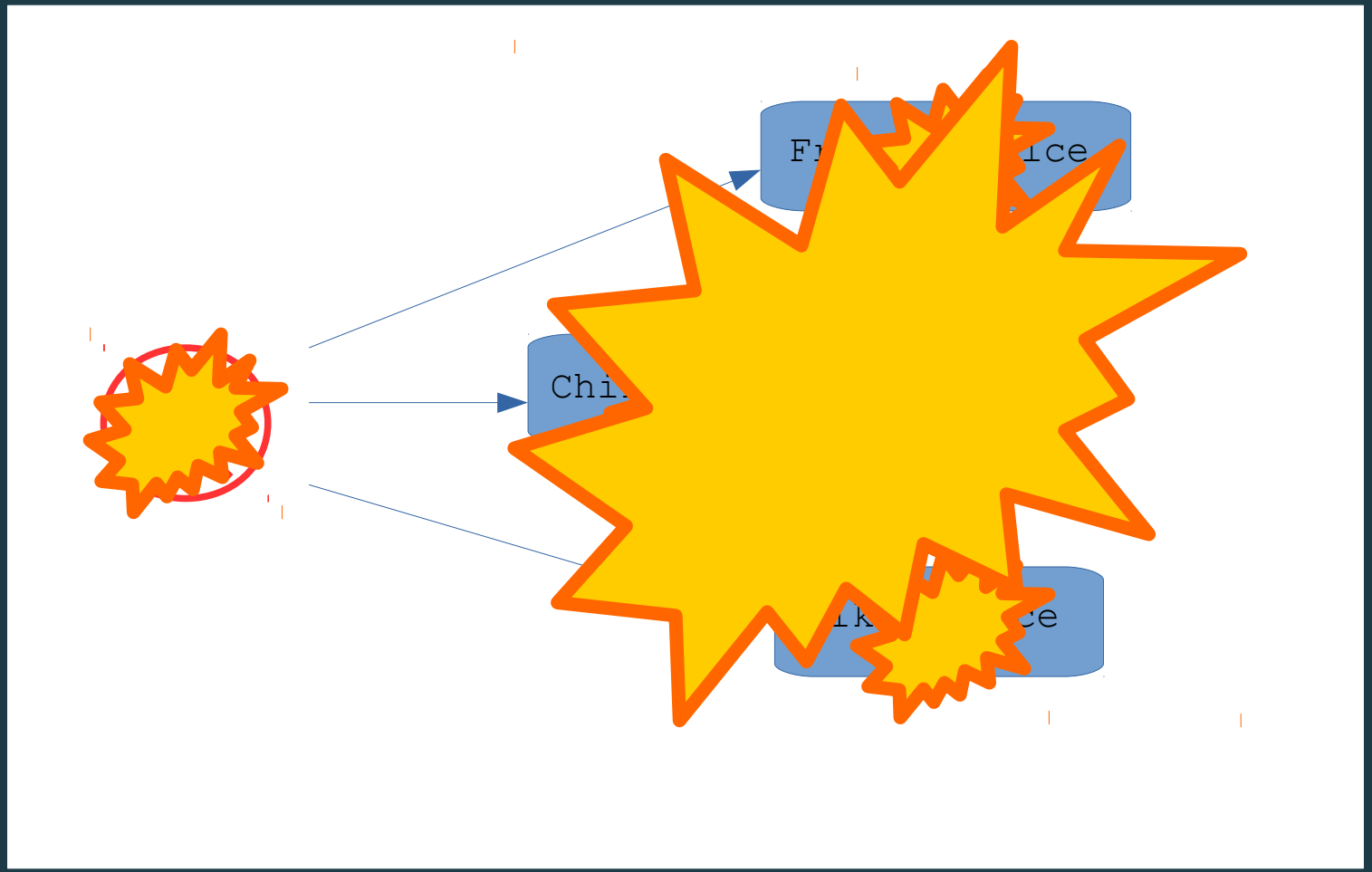

Monolith to microservices

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  - Let's just replace method calls with REST calls!
- When moving to microservices
  - Don't just do 1:1 service/interface replacement
  - Design for asynchronous architecture

Asynchronous in practice

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- Let's look at two approaches

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  1) Denormalize and push data

Asynchronous in practice

- Let's look at two approaches
  1) Denormalize and push data
  2) Communicate through the client

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- Consistency needs to be addressed
  - One approach is at least once messaging and idempotency

Chirper Likes

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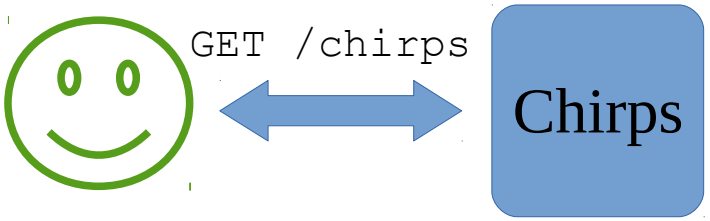

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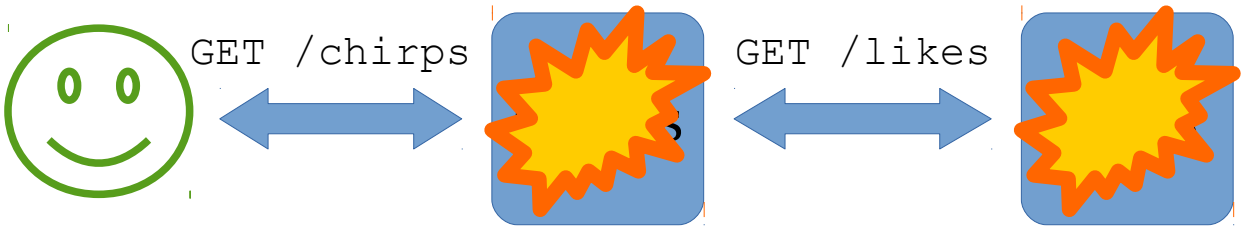

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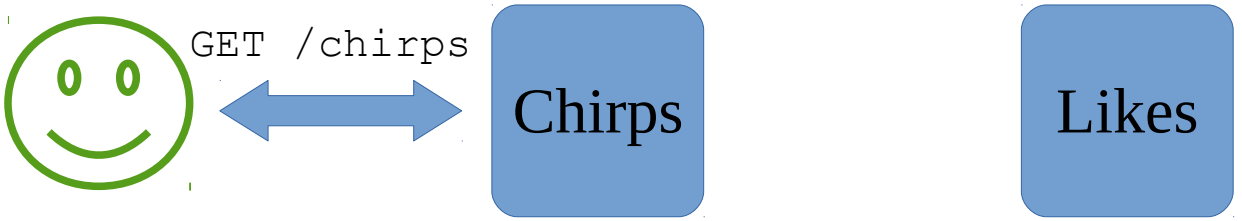

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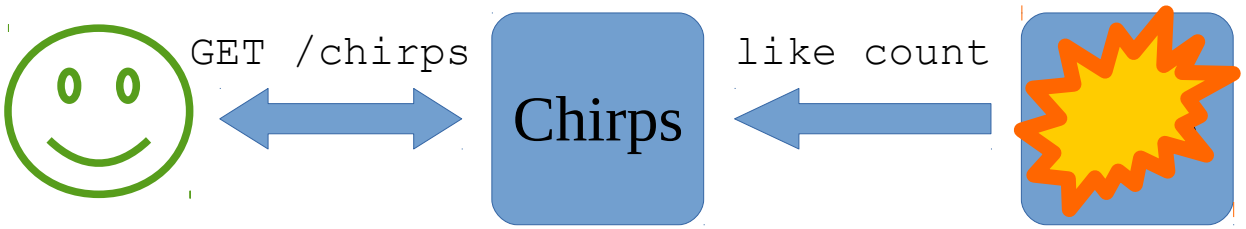

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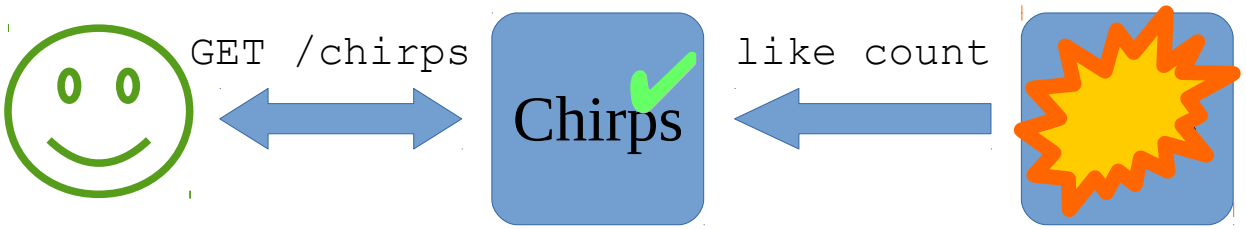

Demo

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- Chirper implemented using Lagom

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  - Reactive microservices framework for the JVM

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  - First class support for asynchronous messaging

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  - Reactive microservices framework for the JVM
  - First class support for asynchronous messaging
  - High productivity development environment
  - Guides you all the way to production

Communicate through client

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  - Mobile clients in particular

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  - Browsers with localStorage

Communicate through client

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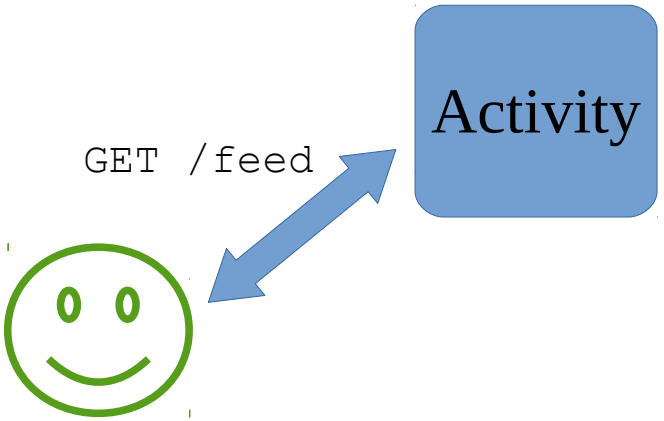
  - Mobile clients in particular
  - Browsers with localStorage
- Client can use own cache as fallback

Chirper Activity Stream

Chirper Activity Stream



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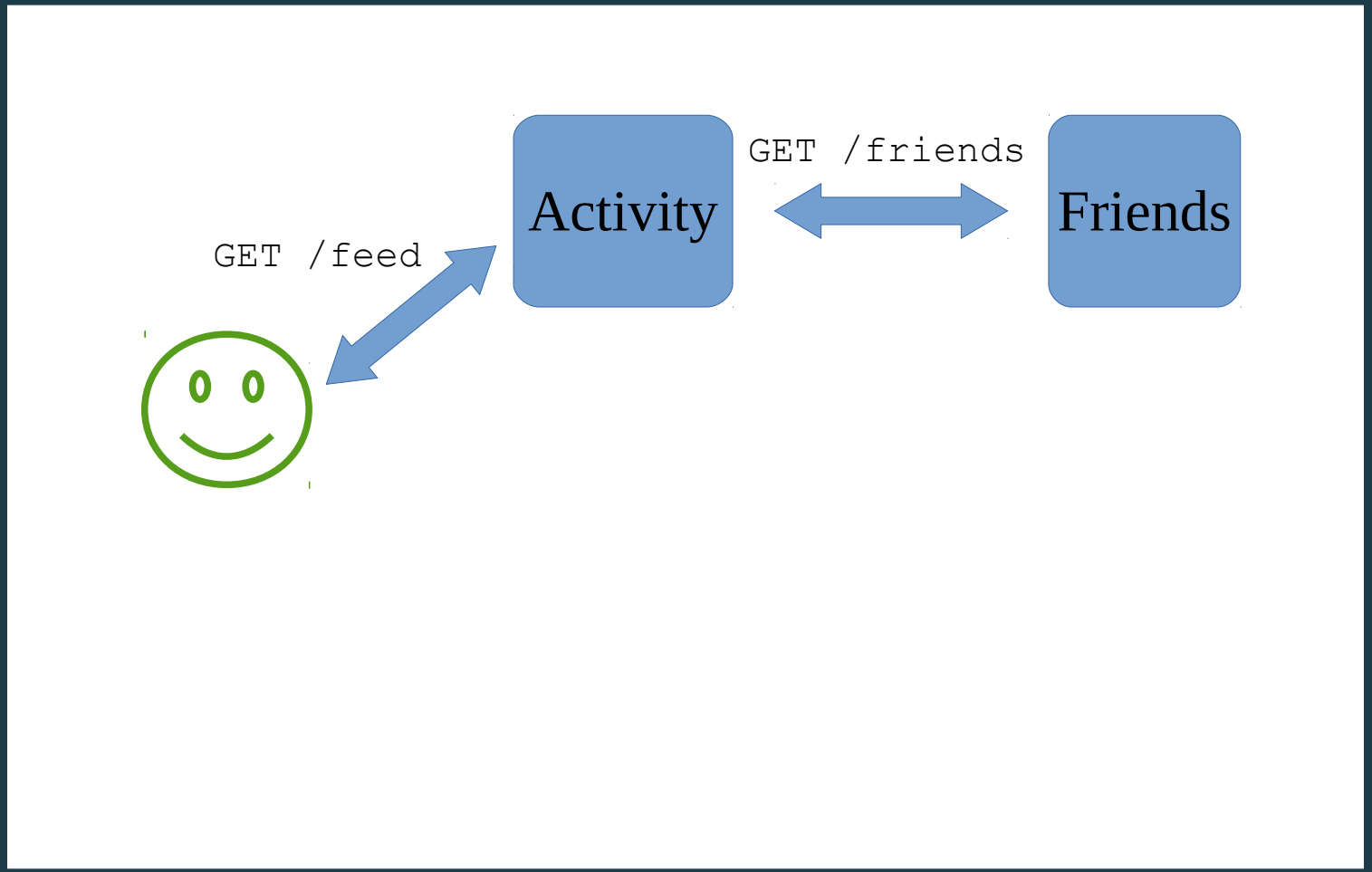
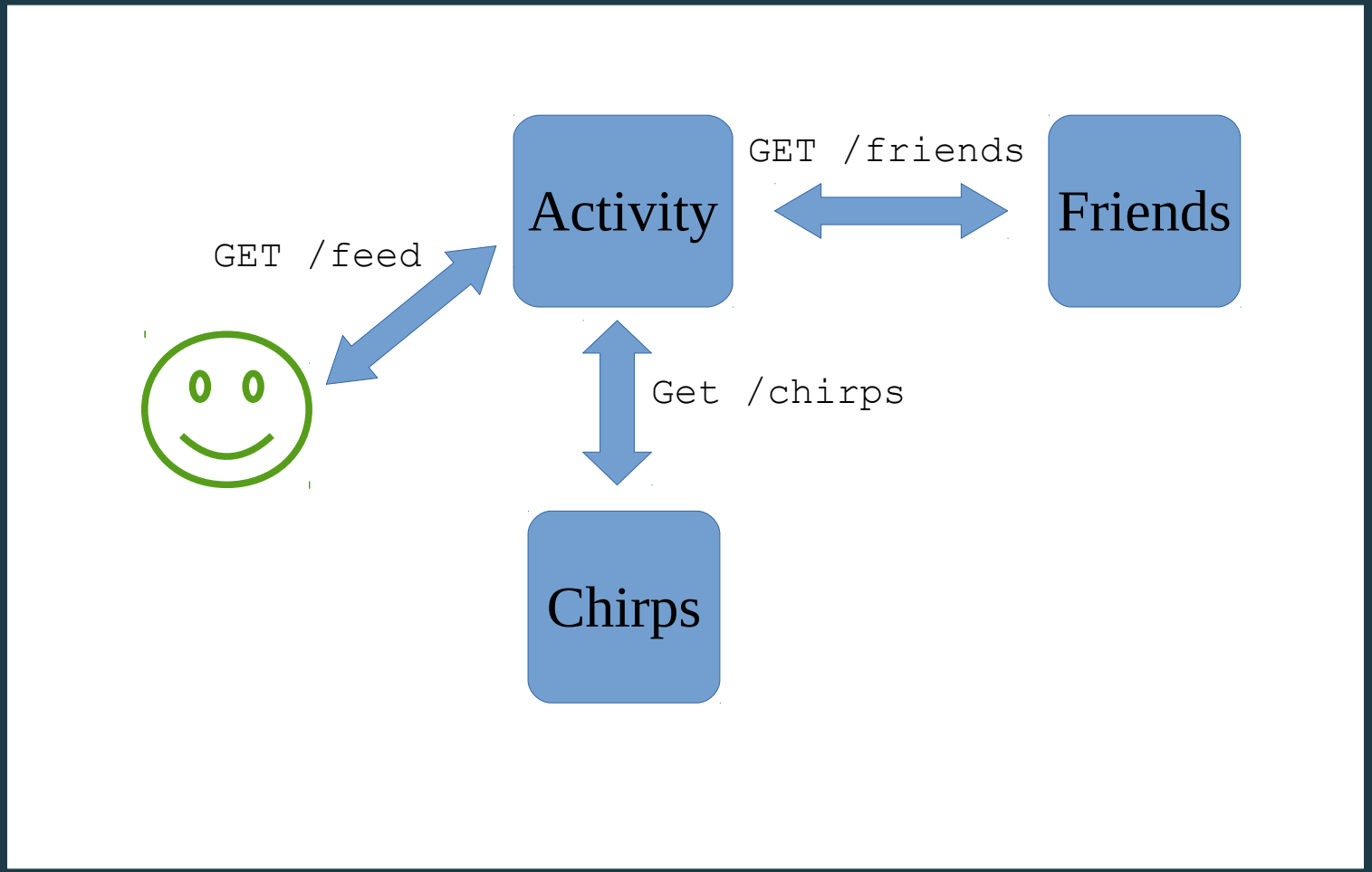
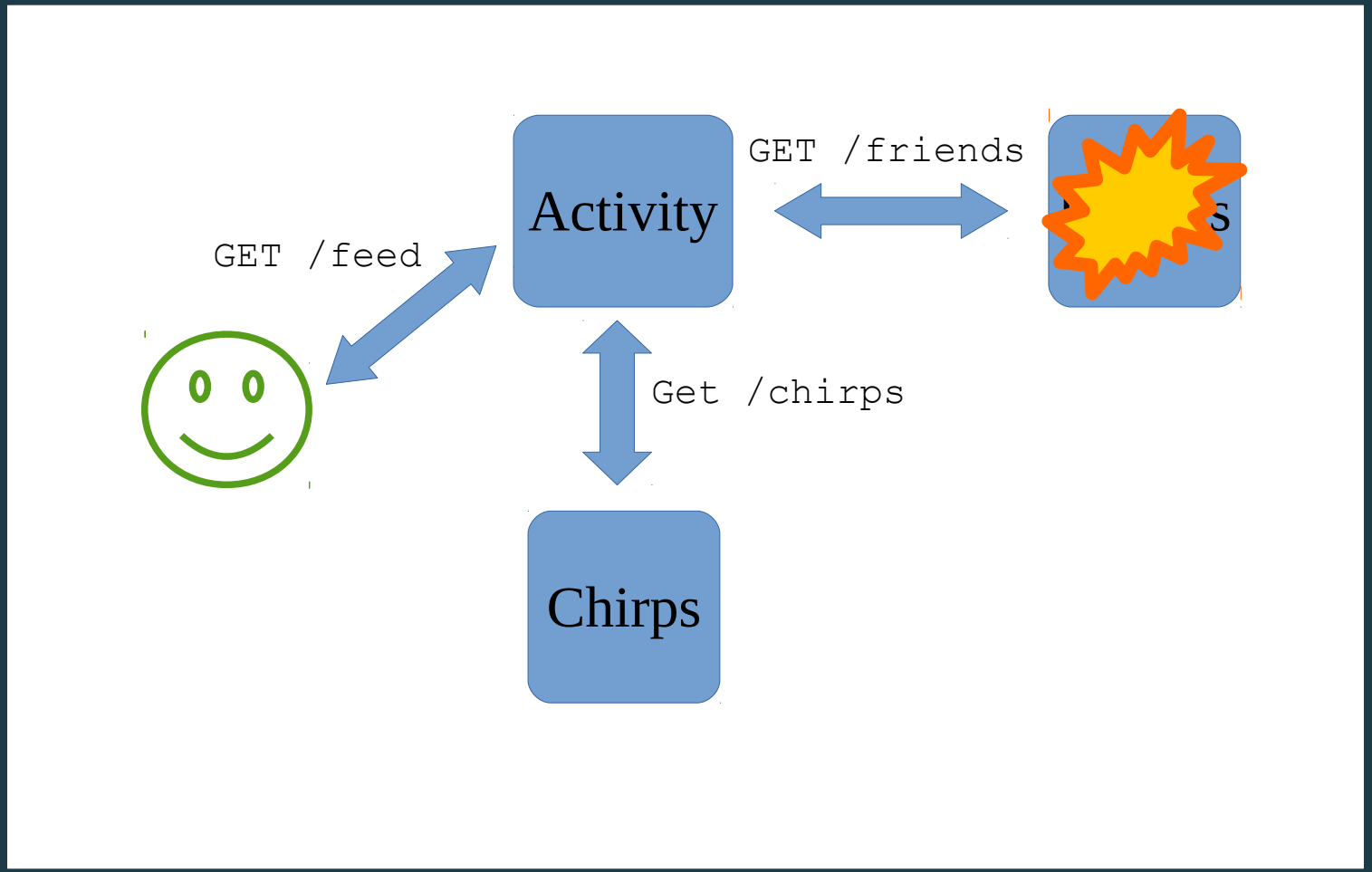


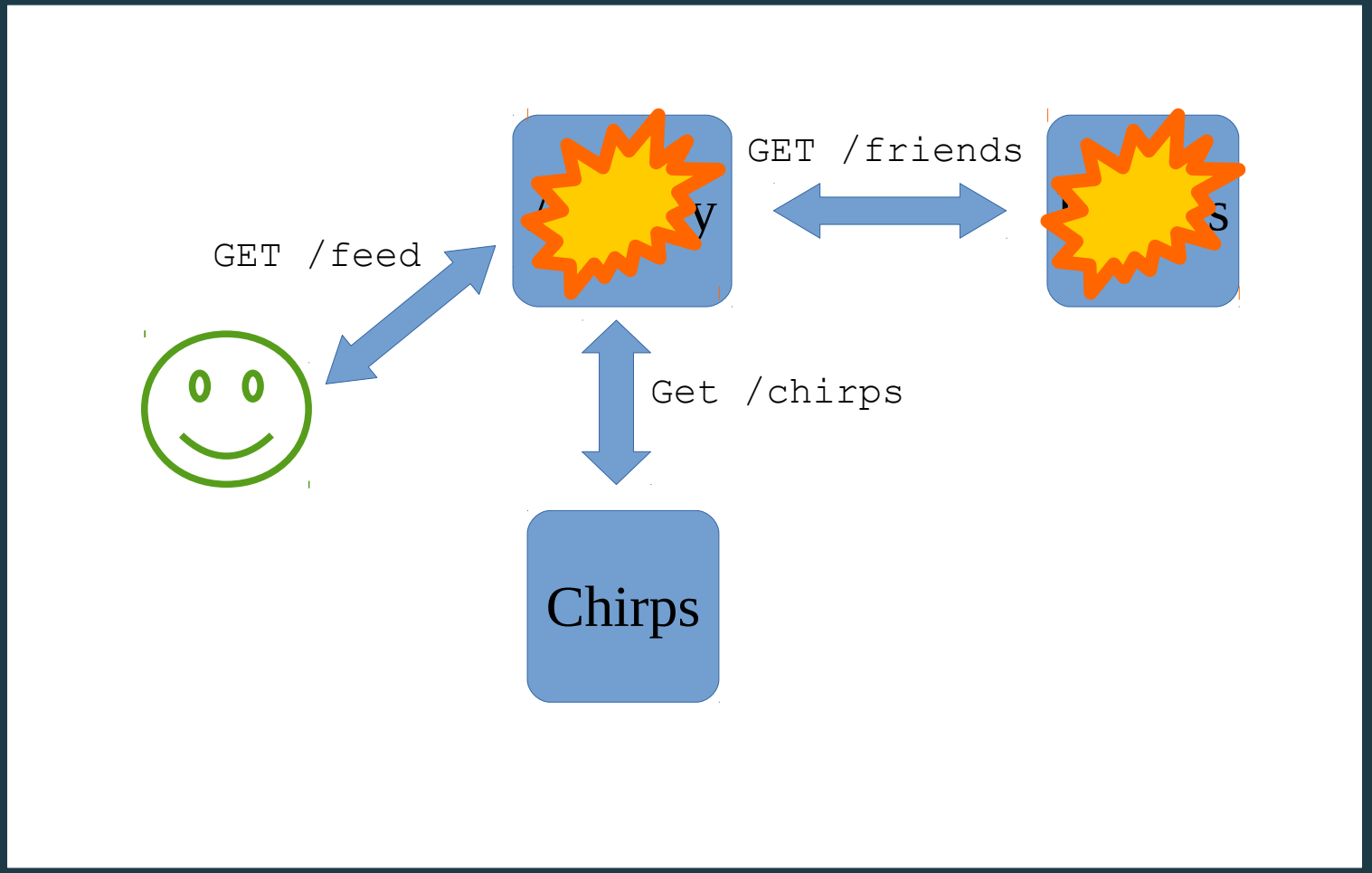
Chirper Activity Stream



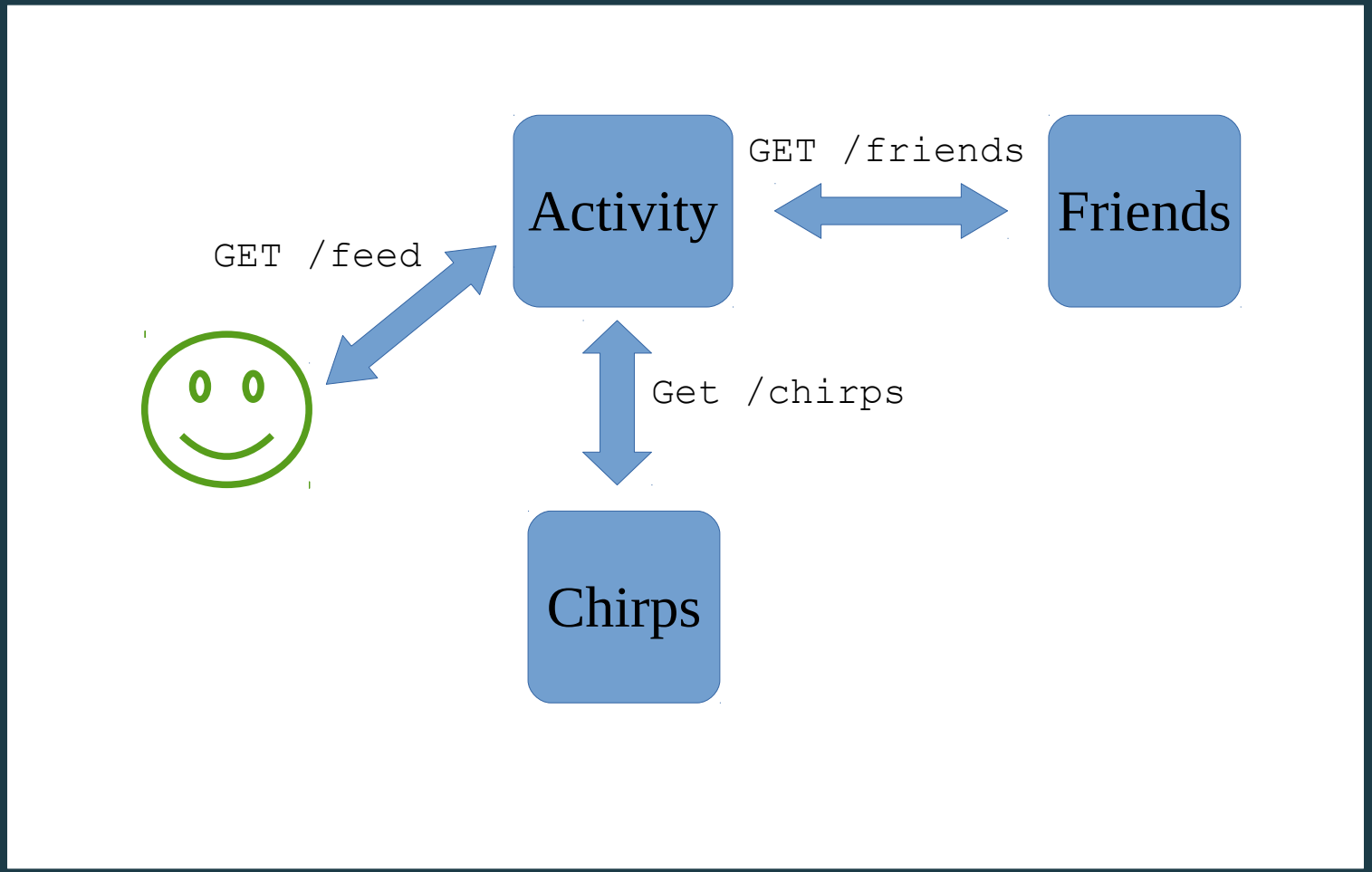
Chirper Activity Stream



Chirper Activity Stream



Chirper Activity Stream



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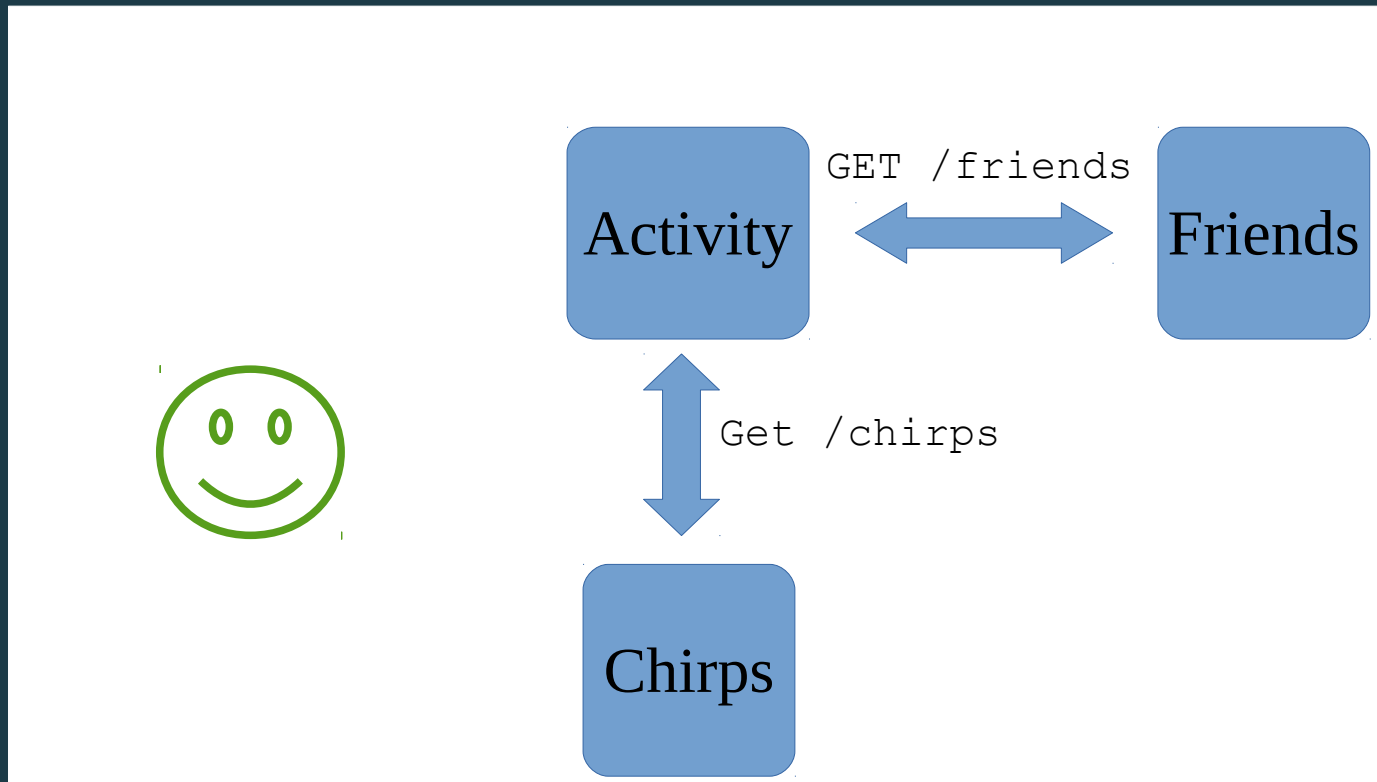

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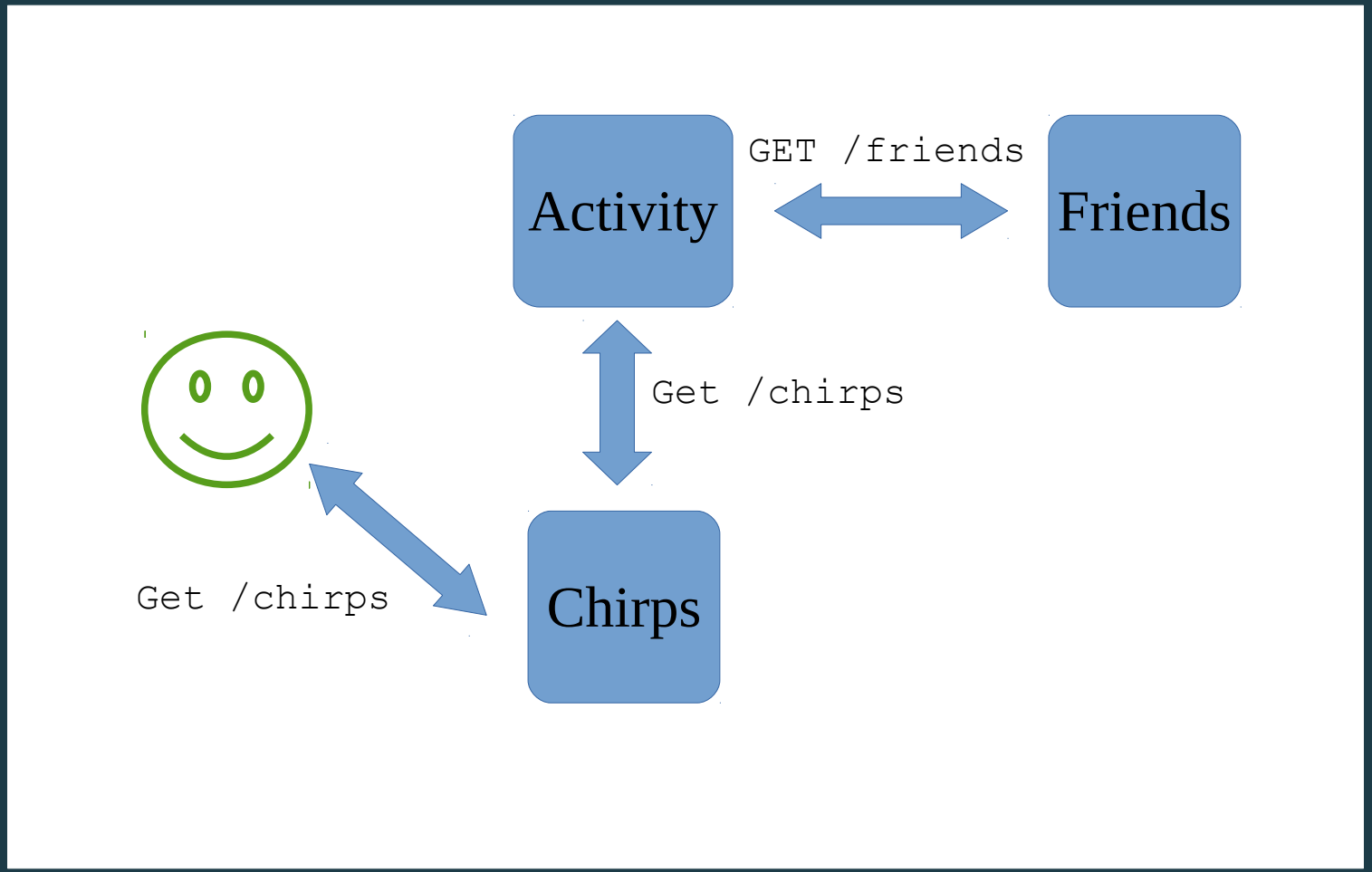

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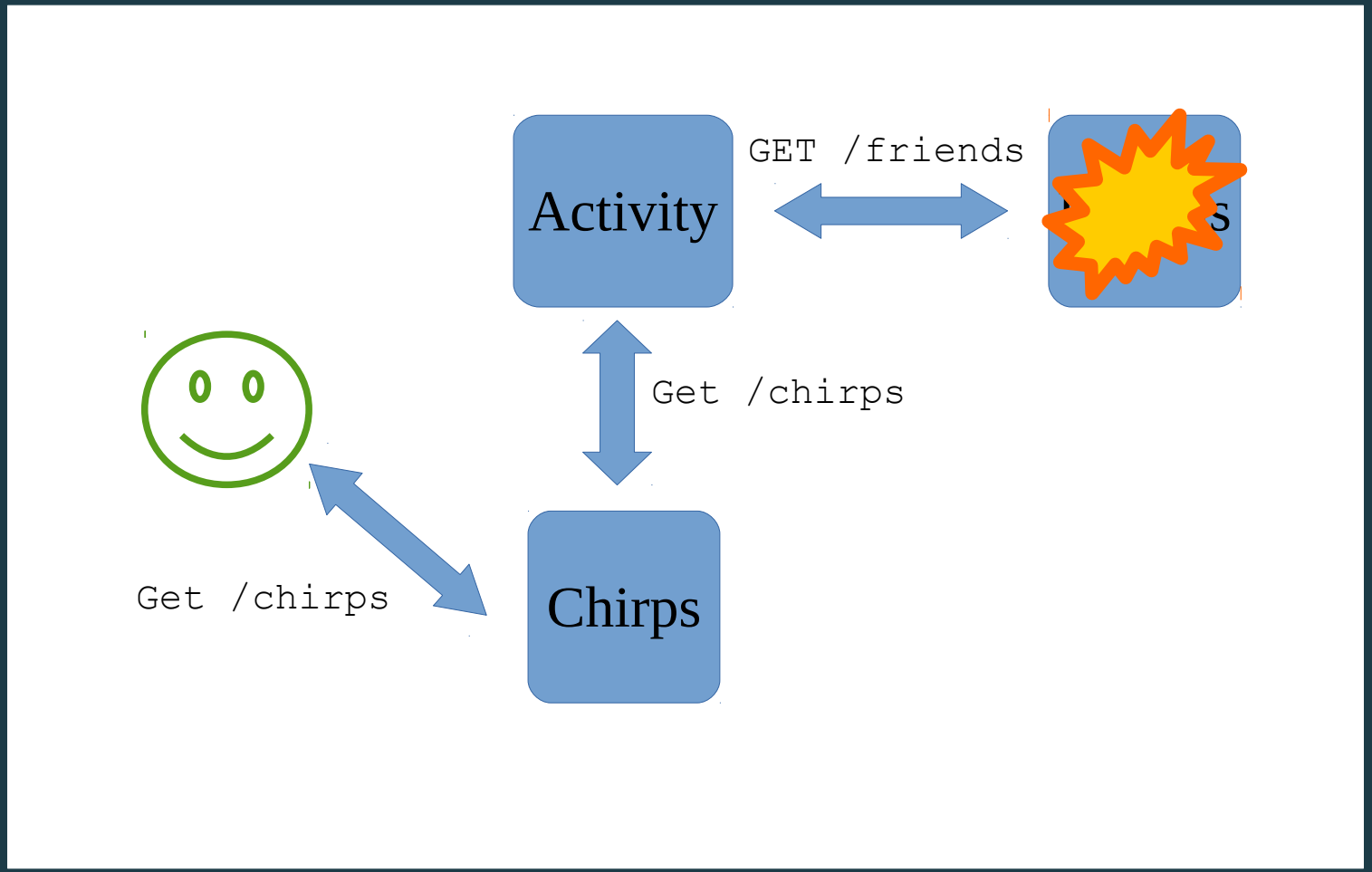

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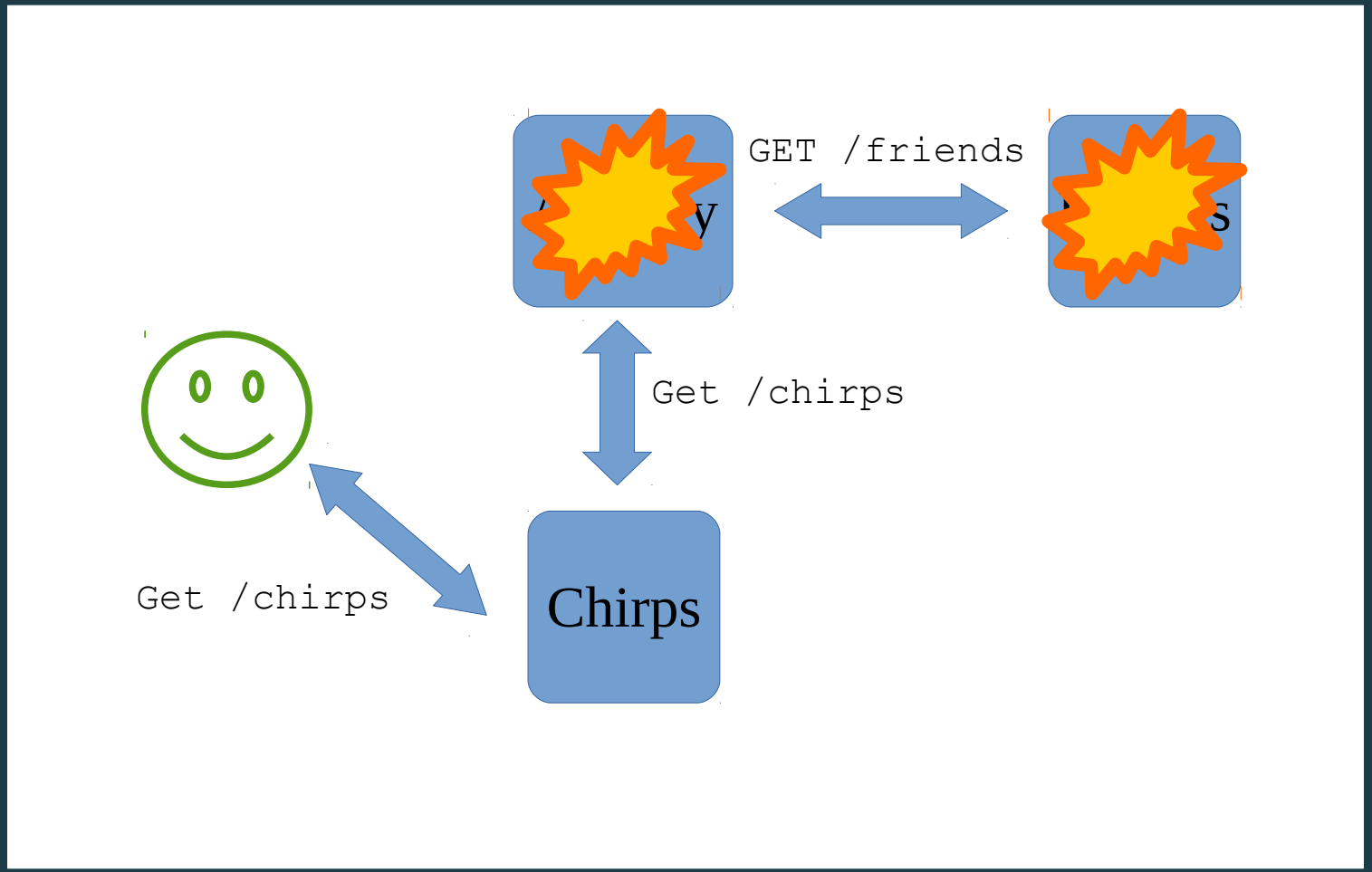
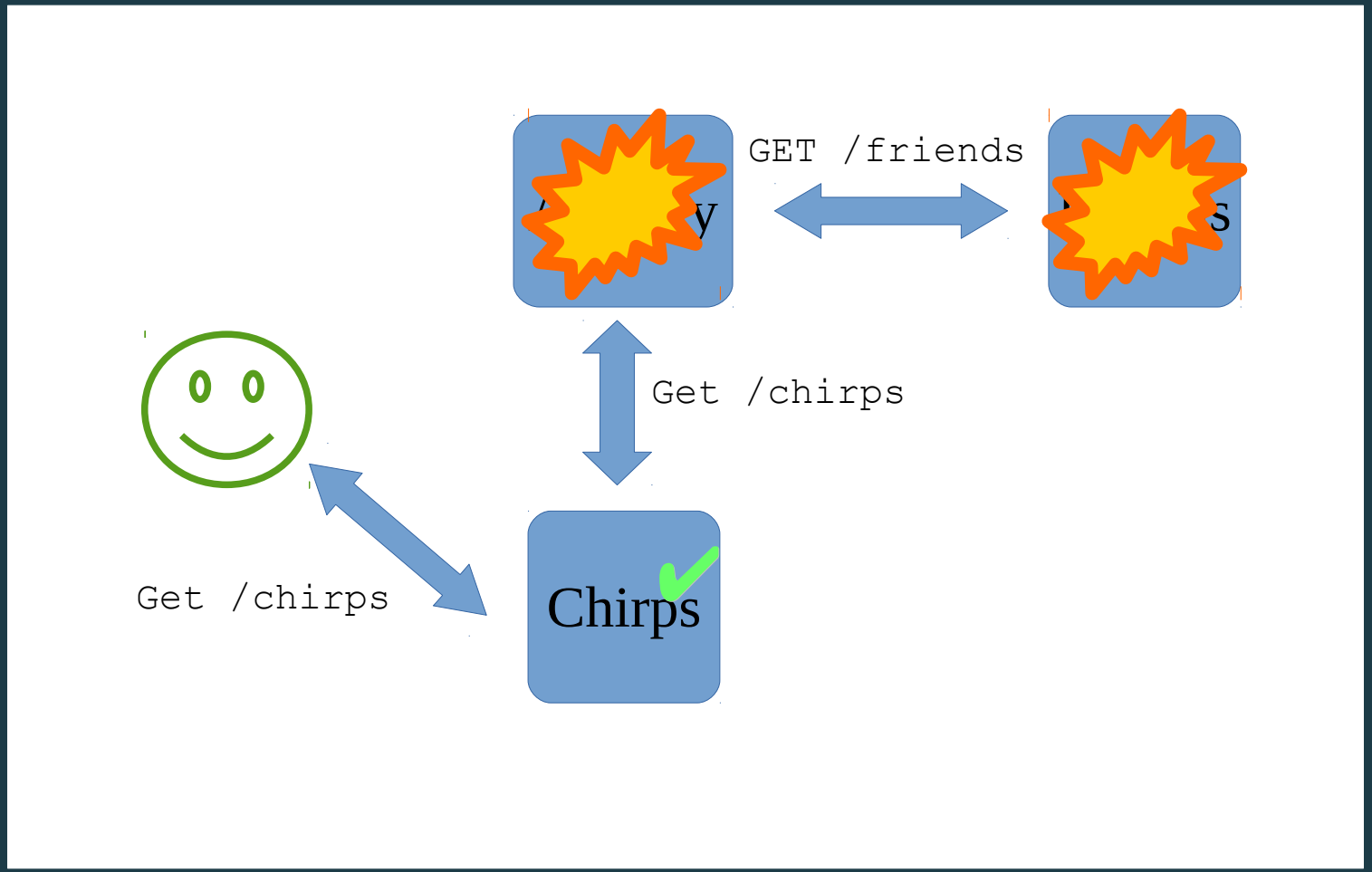


Chirper Activity Stream



Demo

Client authorization

Client authorization

- Communicate authorization through client

Client authorization

- Communicate authorization through client
  - Use authorization tokens, eg JWT

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  - Load token with entity – eg friends

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Client authorization

- Communicate authorization through client
  - Use authorization tokens, eg JWT
  - Load token with entity – eg friends
  - Send that token with actions
  - Receiving service authorizes using token

Next steps

- Try out Lagom
  - https://lightbend.com/lagom
- Read Jonas Bonér's *Reactive Services Architecture*
  - https://lightbend.com/reactive-microservices-architecture
- Check out this presentation
  - https://github.com/jroper/rethinking-rest