MONOLITH TO REACTIVE

It's all about architecture

James Roper

@jroper

Lightbend

AGENDA

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- Identify pitfalls of monolith conversions

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- Architect reactive solutions

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- See Lagom in action

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- Architect reactive solutions
- See Lagom in action
- Live coding!

LAGOM AUCTION

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- ebay clone

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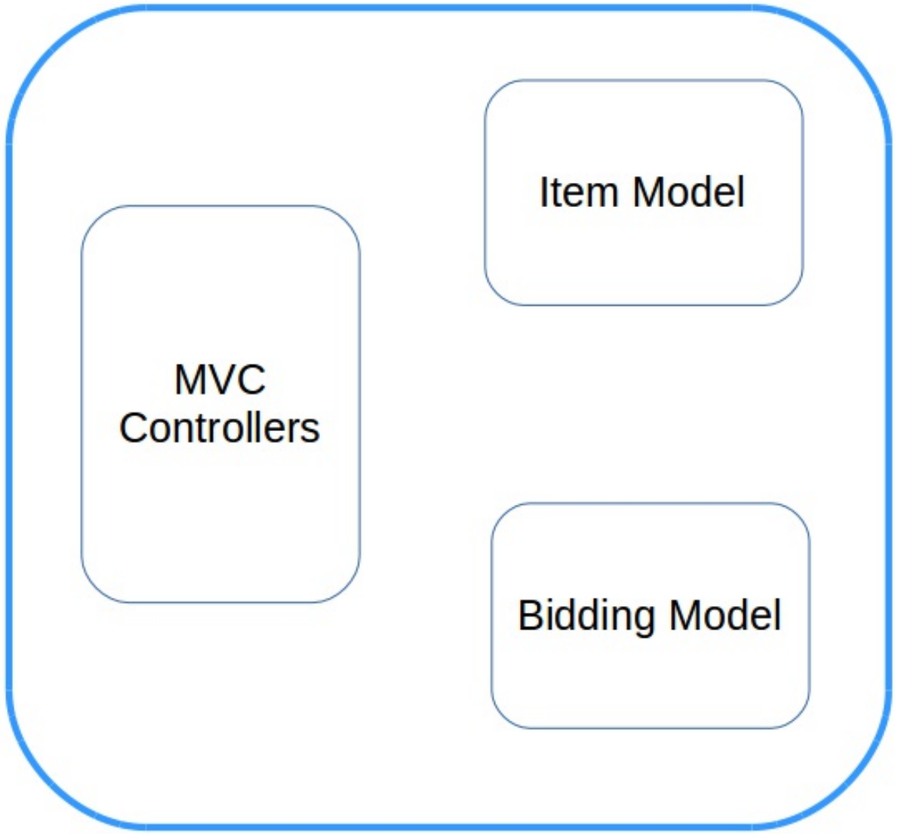
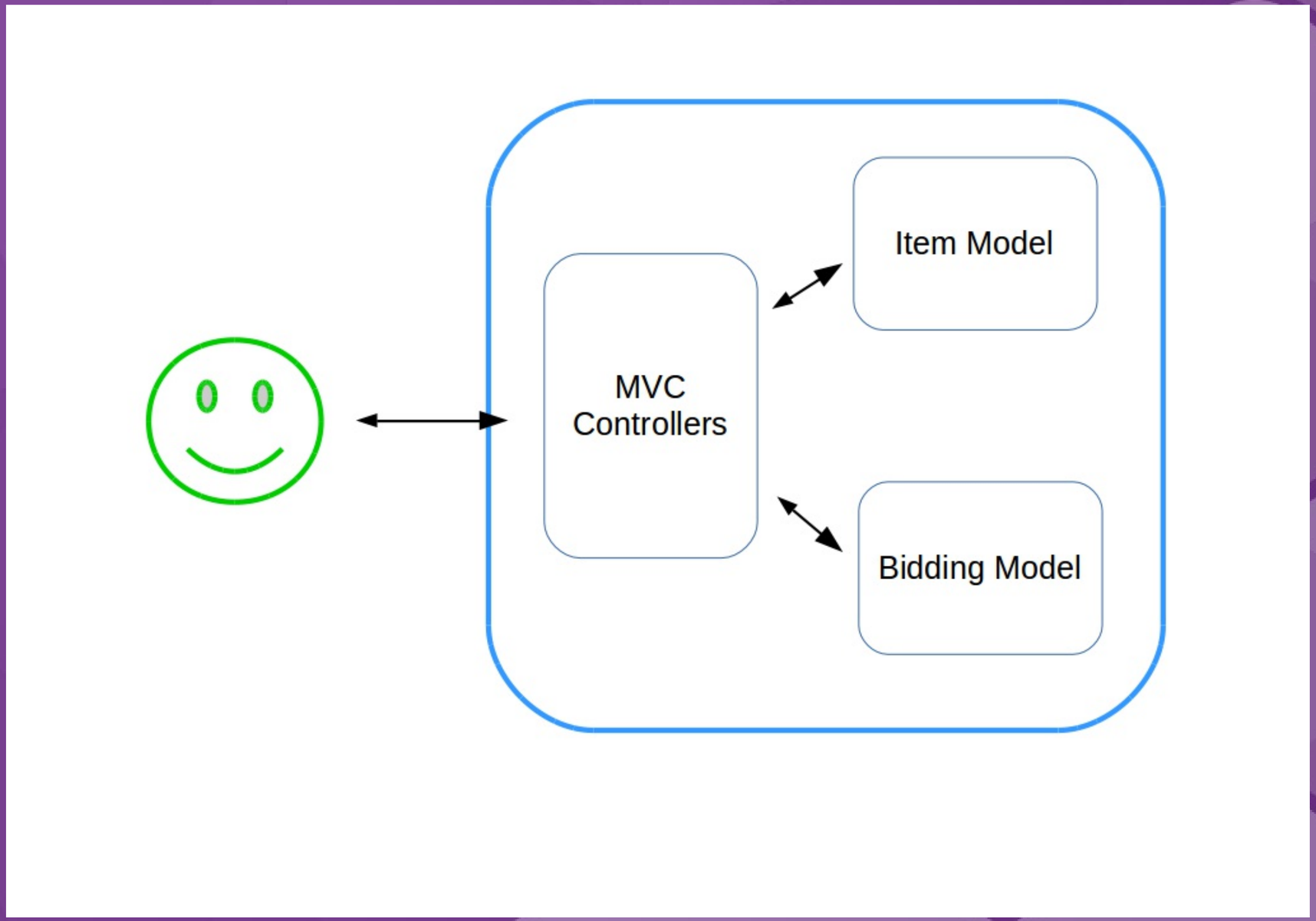
- Was a monolith, converted to microservices

LAGOM AUCTION

- ebay clone
- Was a monolith, converted to microservices
- Will one day overtake ebay!


Item Model
MVC
Controllers
Bidding Model


Item Model
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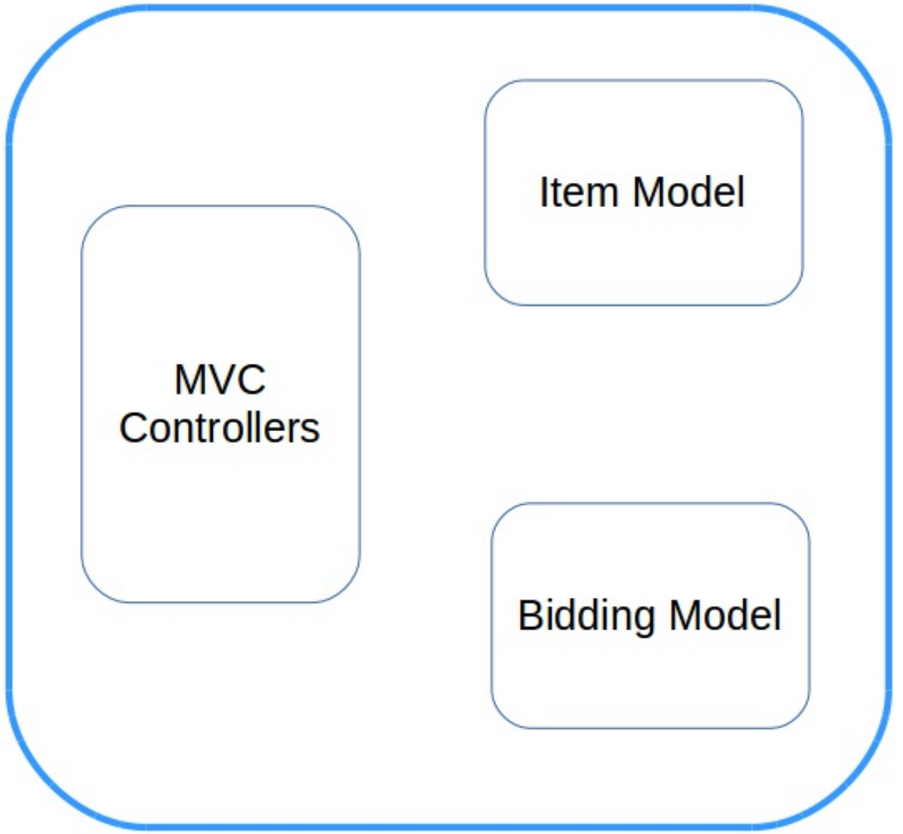

Item Model
MVC
Controllers
Bidding Model

MVC
Controllers

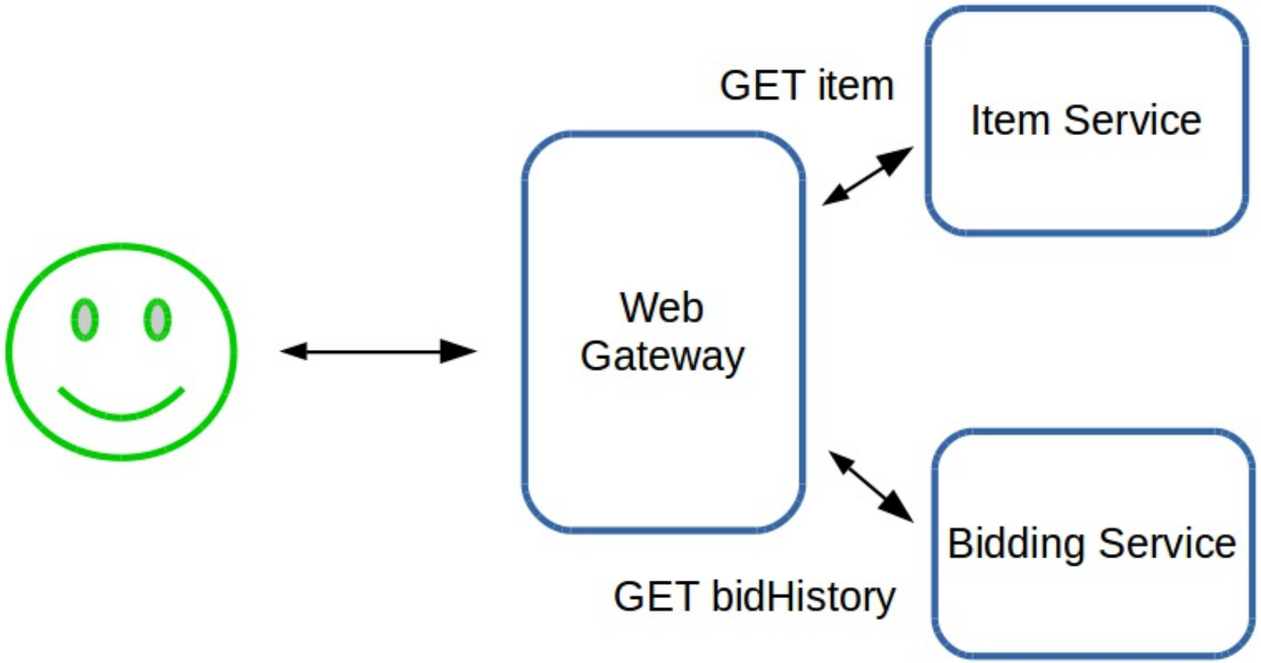
Item Model

Bidding Model

Web Gateway

Item Model

Bidding Model


GET item
Item Service
Web
Gateway
Bidding Service
GET bidHistory

WHAT IF SOMETHING GOES WRONG?

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SYNCHRONOUS COMMUNICATION

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synchronous *adj.* - existing or occurring at the same time.

SYNCHRONOUS COMMUNICATION

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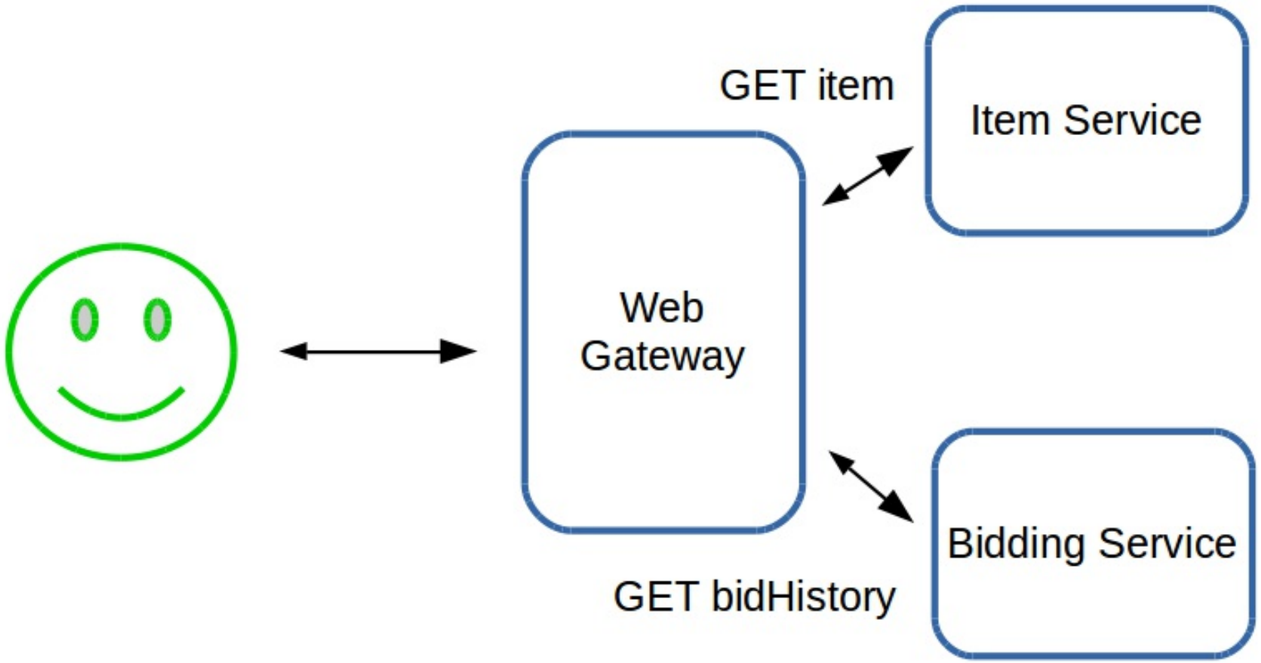
- Typically request/response

SYNCHRONOUS COMMUNICATION

- Typically request/response
  - e.g. REST

SYNCHRONOUS COMMUNICATION

- Typically request/response
  - e.g. REST
- Both systems must be responsive at the same time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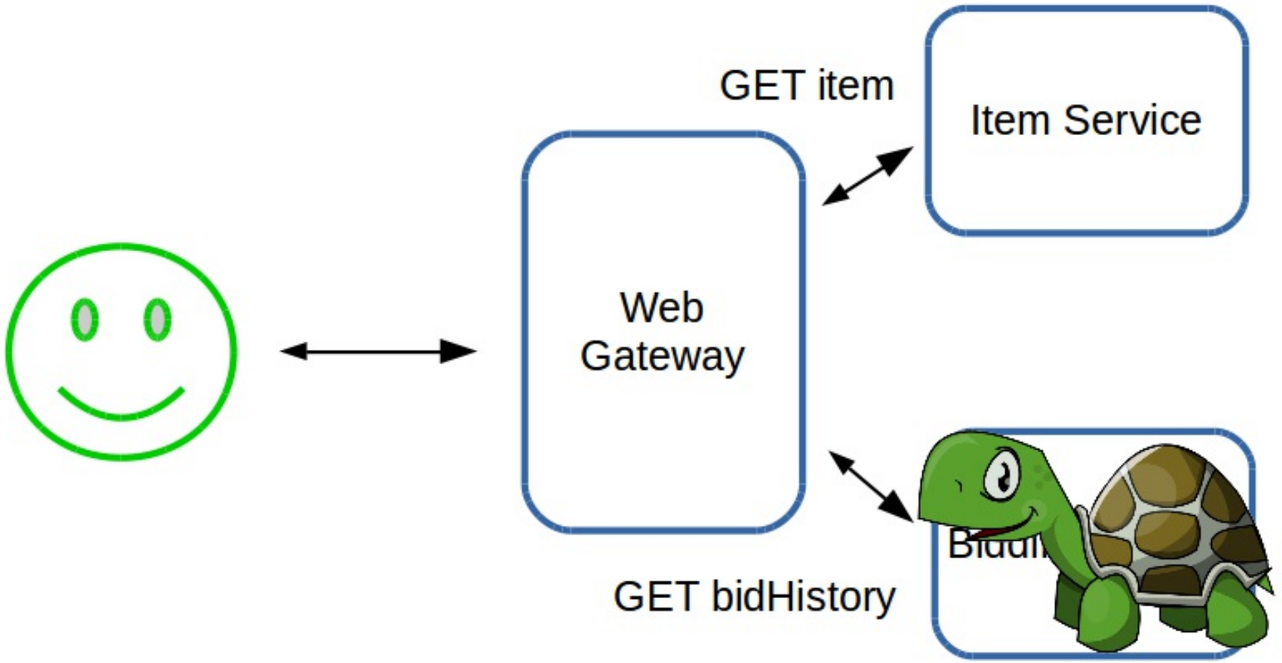
Item Service
Web
Gateway
Bidding Service
GET bidHistory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Web
Gateway
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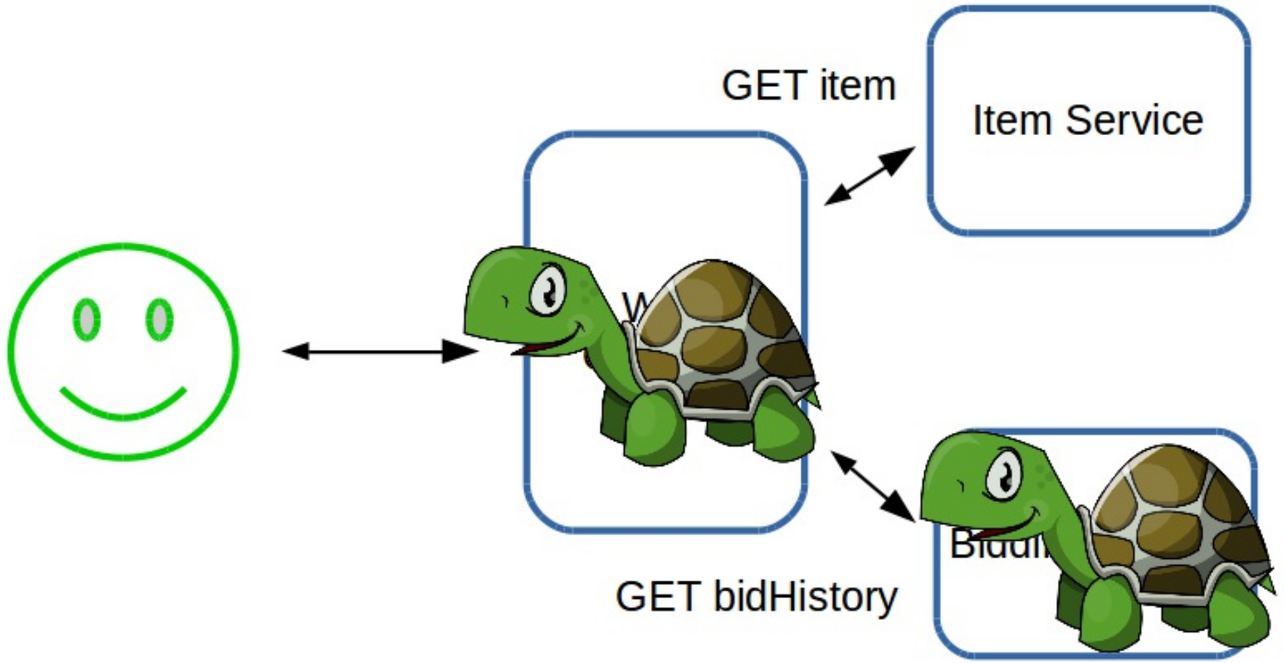
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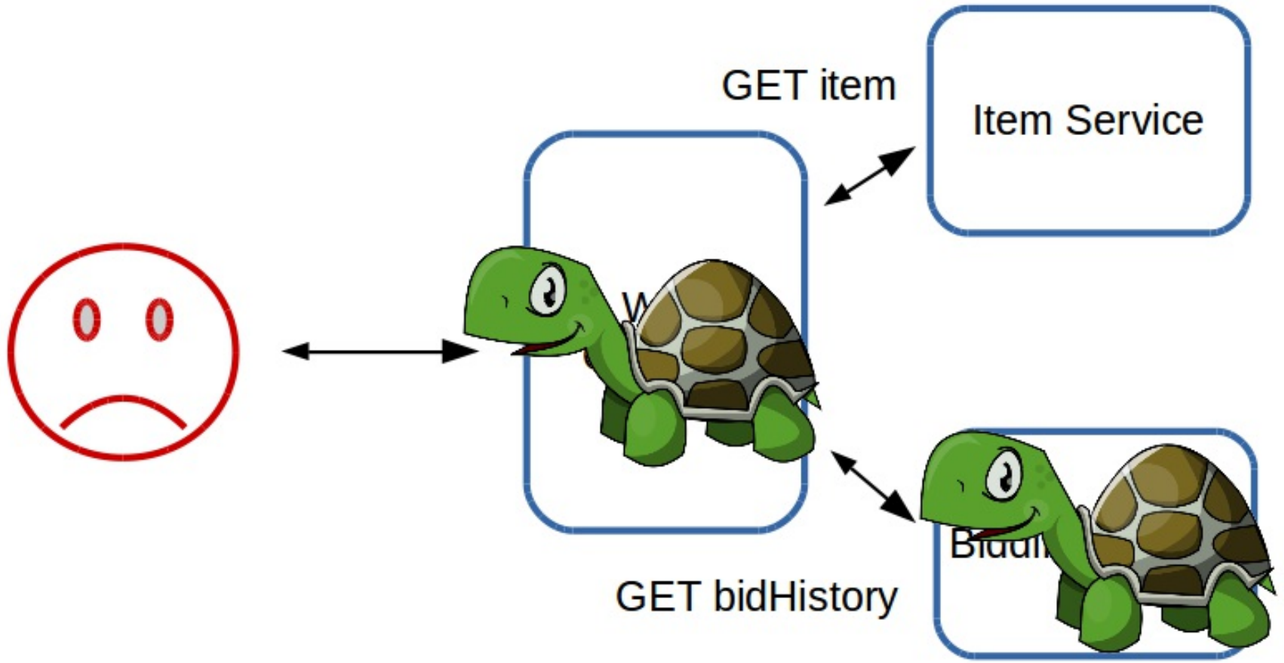
GET item
Item Service
GET bidHistory

PATTERN 1: CIRCUIT BREAKERS

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- A gate that opens in the event of failure

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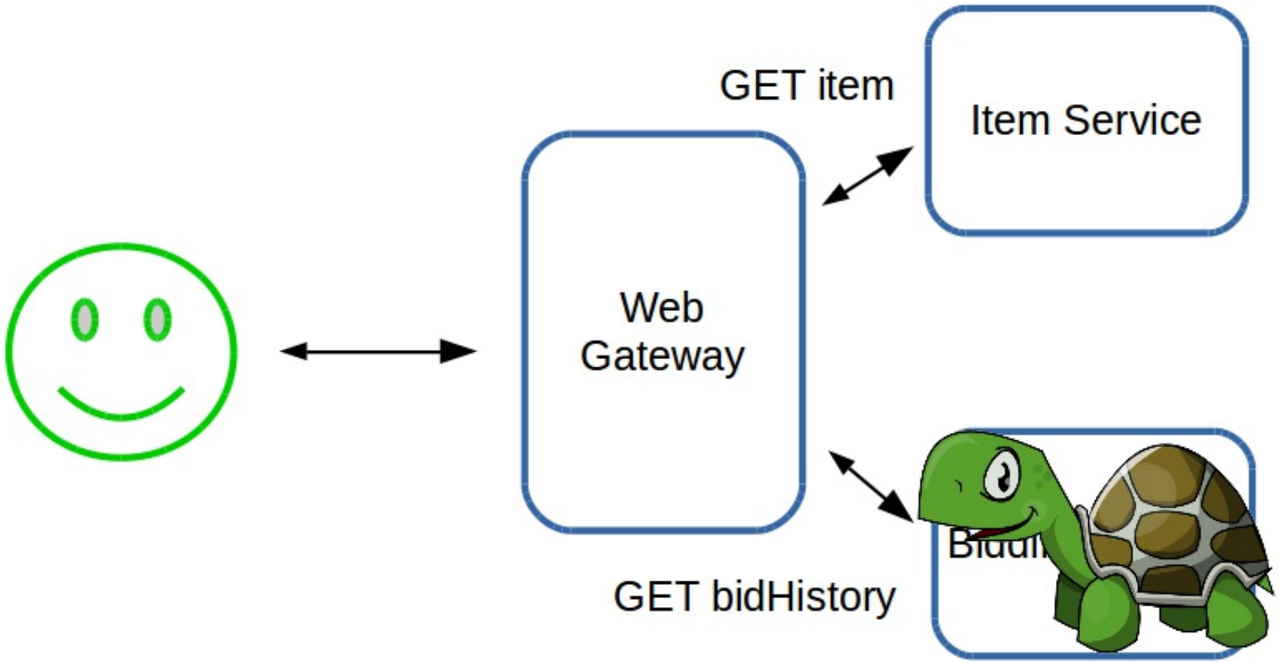
PATTERN 1: CIRCUIT BREAKERS

- A gate that opens in the event of failure
  - Including timeouts
- Protects already failing services
- Allows fail fast handling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Web
Gateway
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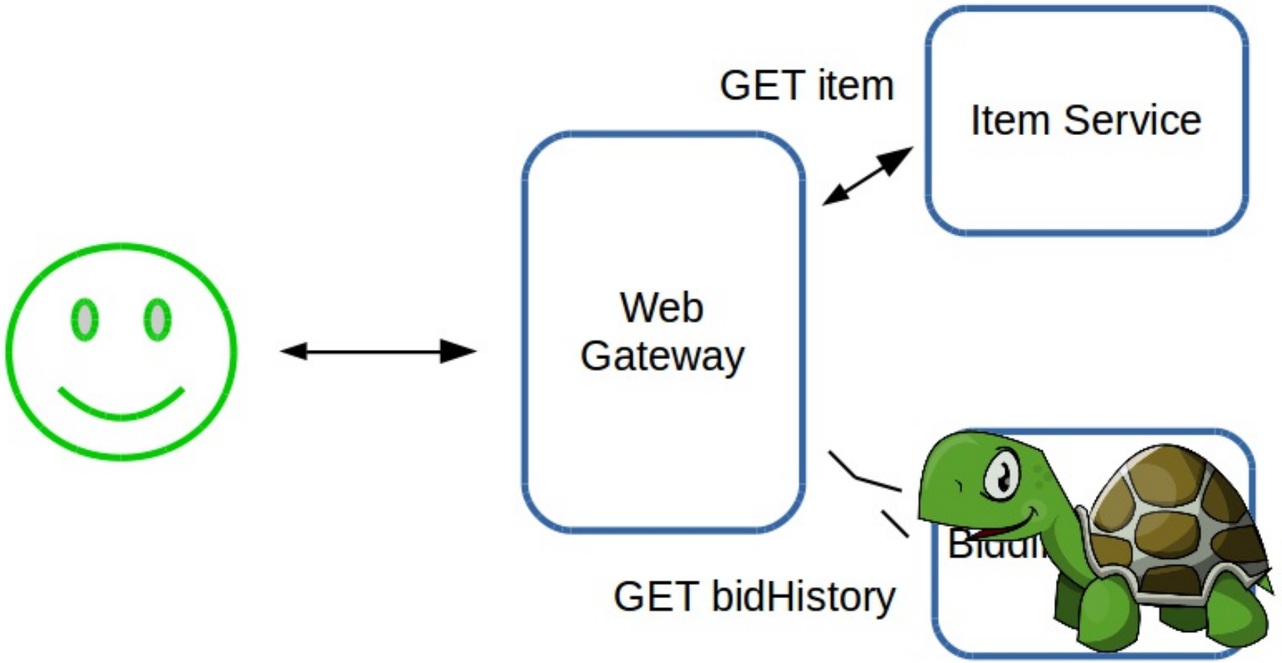
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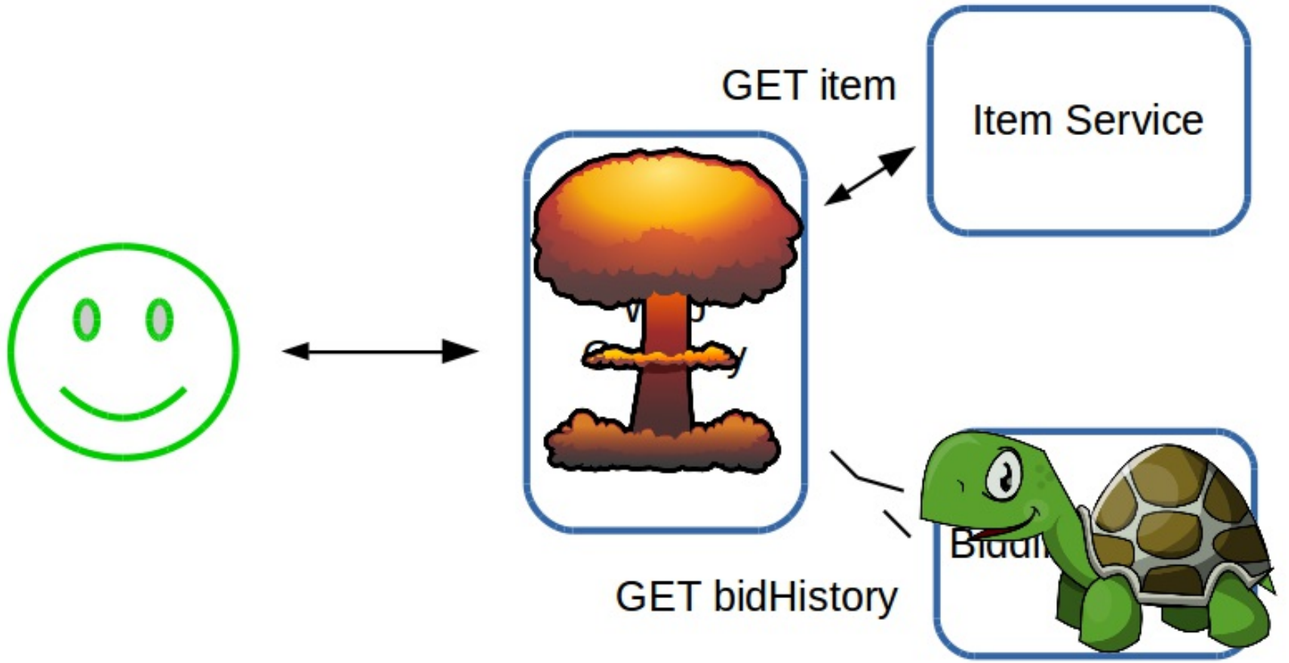
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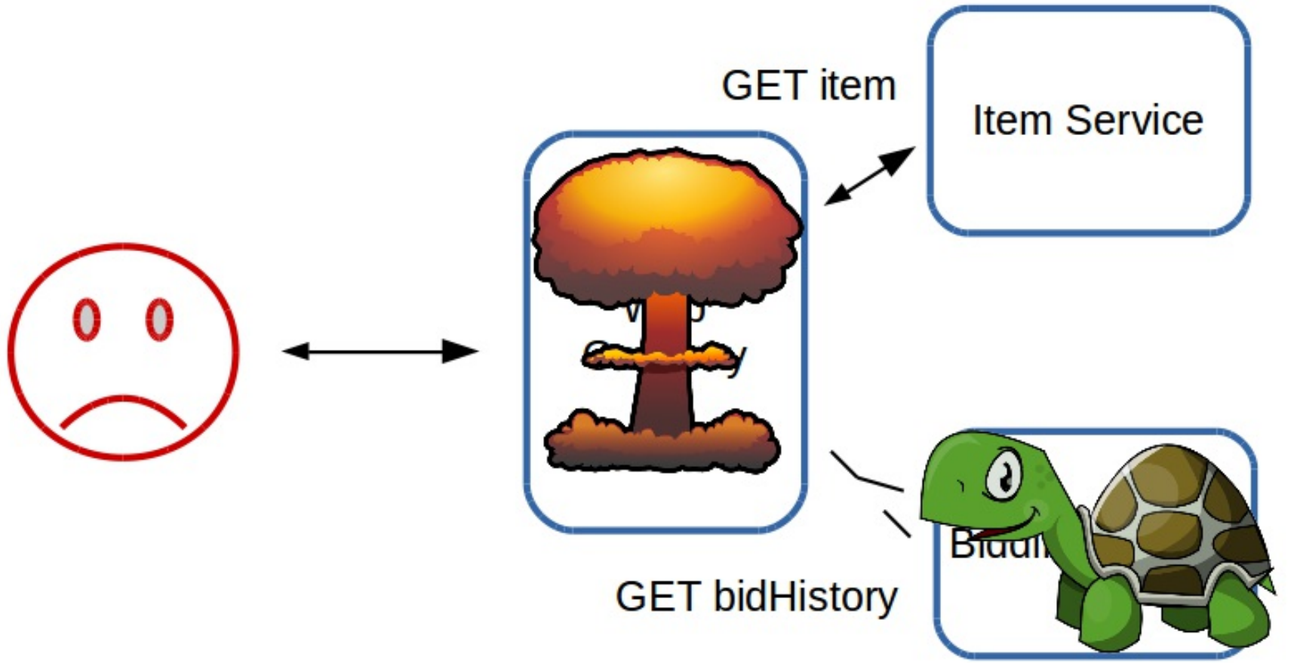
GET bidHistory


GET item
Item Service
GET bidHistory

PATTERN 2: FAILURE RECOVERY

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- Work around failure by degrading

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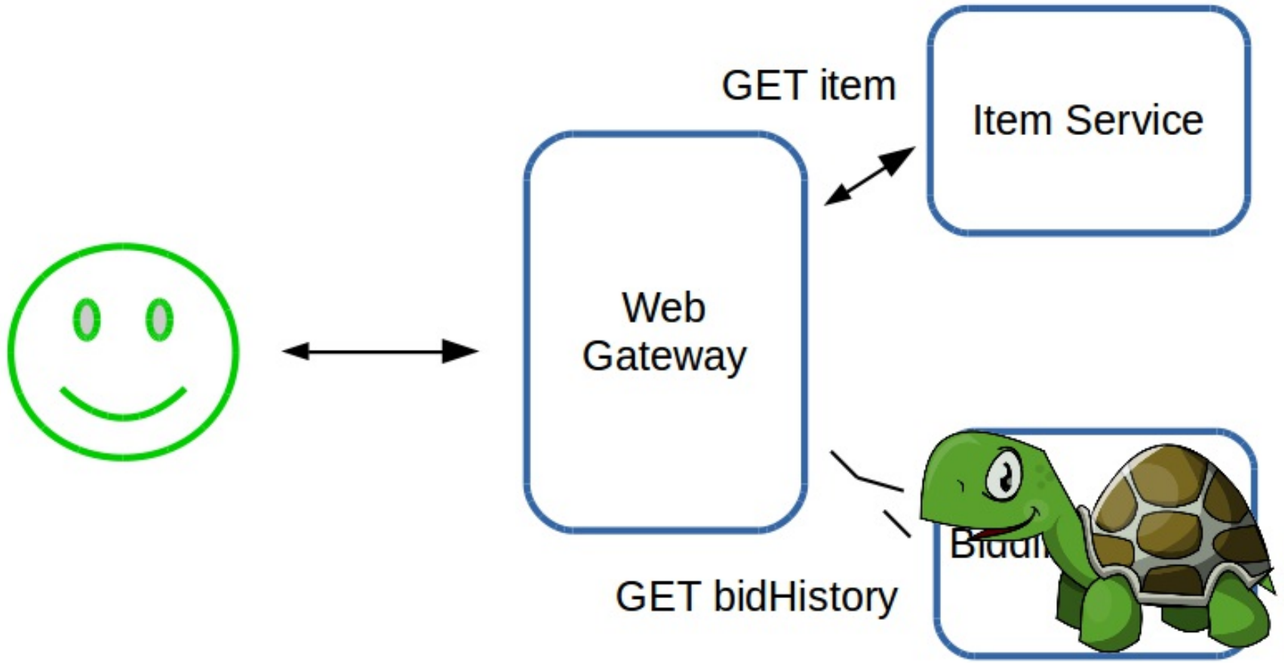
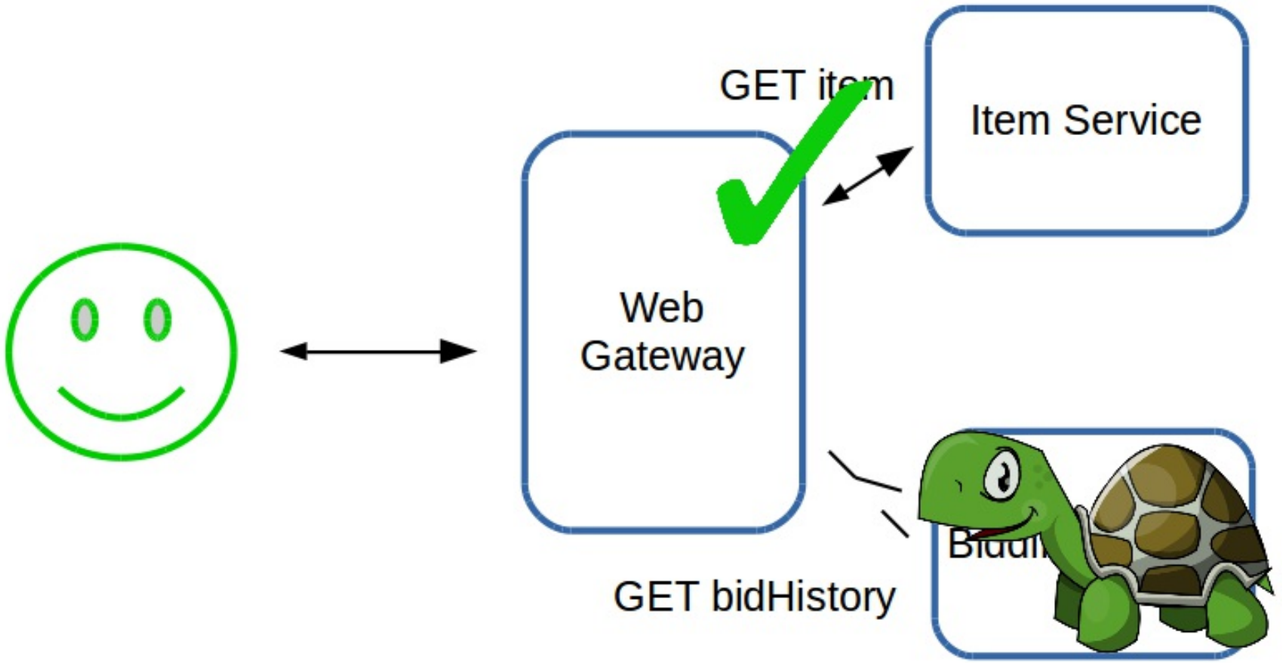
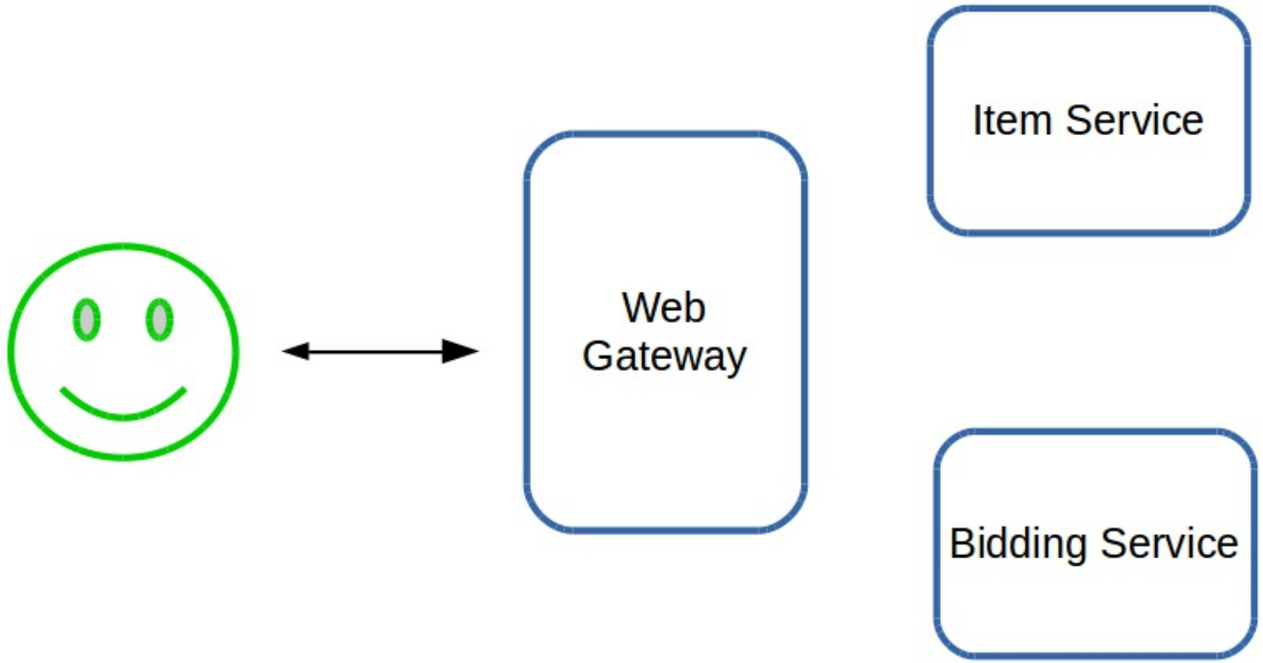
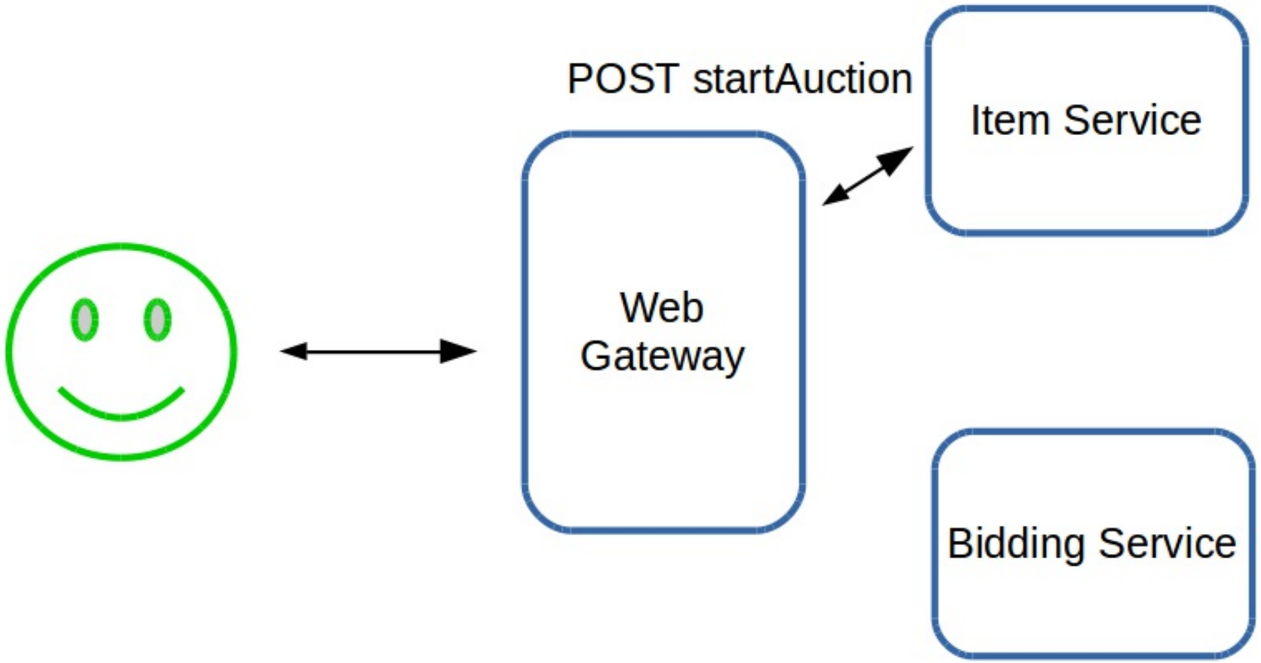
- Work around failure by degrading
- Not every call is necessary to render every page


GET item
Item Service
Web
Gateway
GET bidHistory


GET item
Item Service
Web
Gateway
GET bidHistory

FAILURE CAN LEAD TO INCONSISTENCY


Item Service
Web
Gateway
Bidding Service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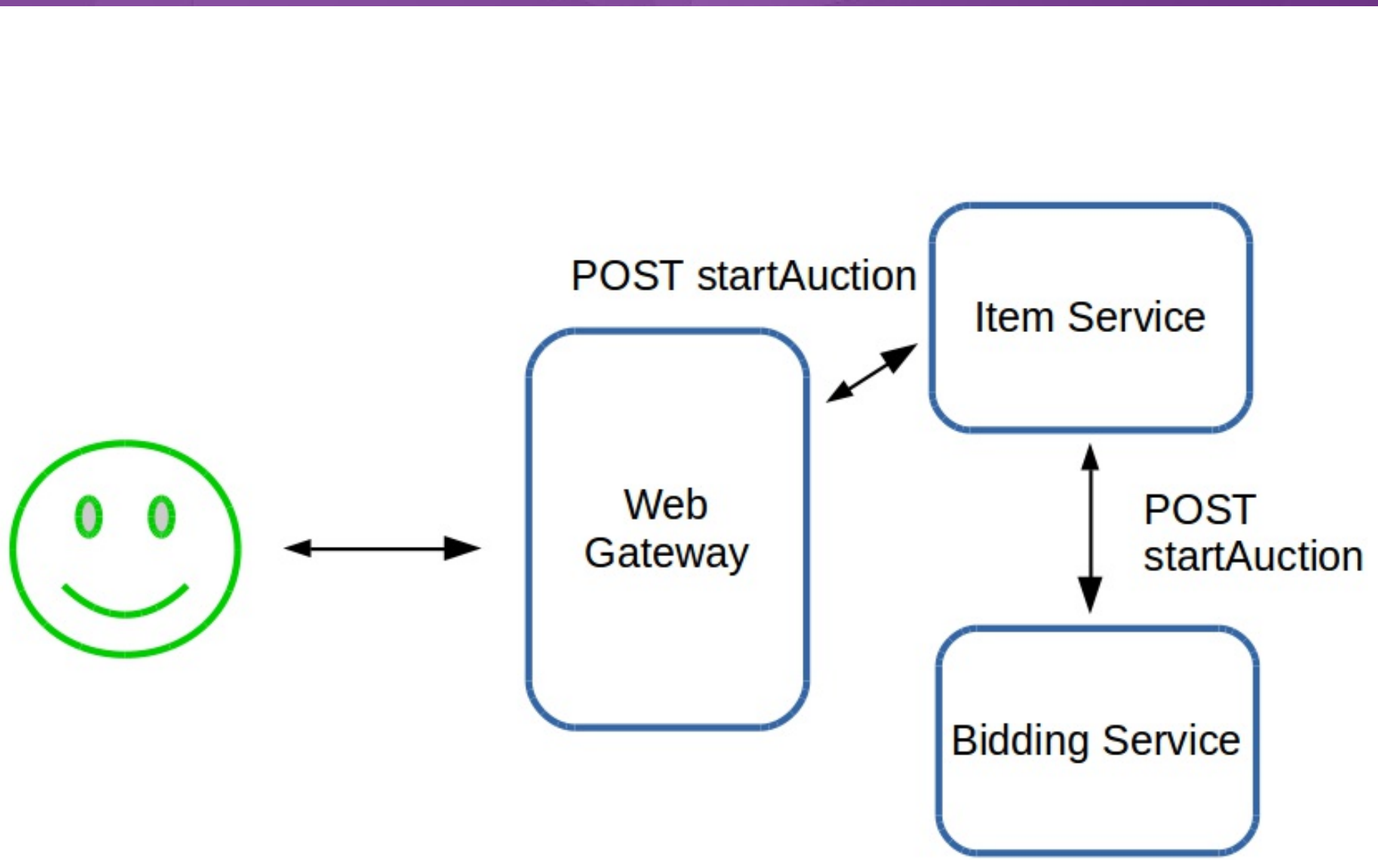
Item Service
Web
Gateway
Bidding Service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Item Service
Web
Gateway
POST
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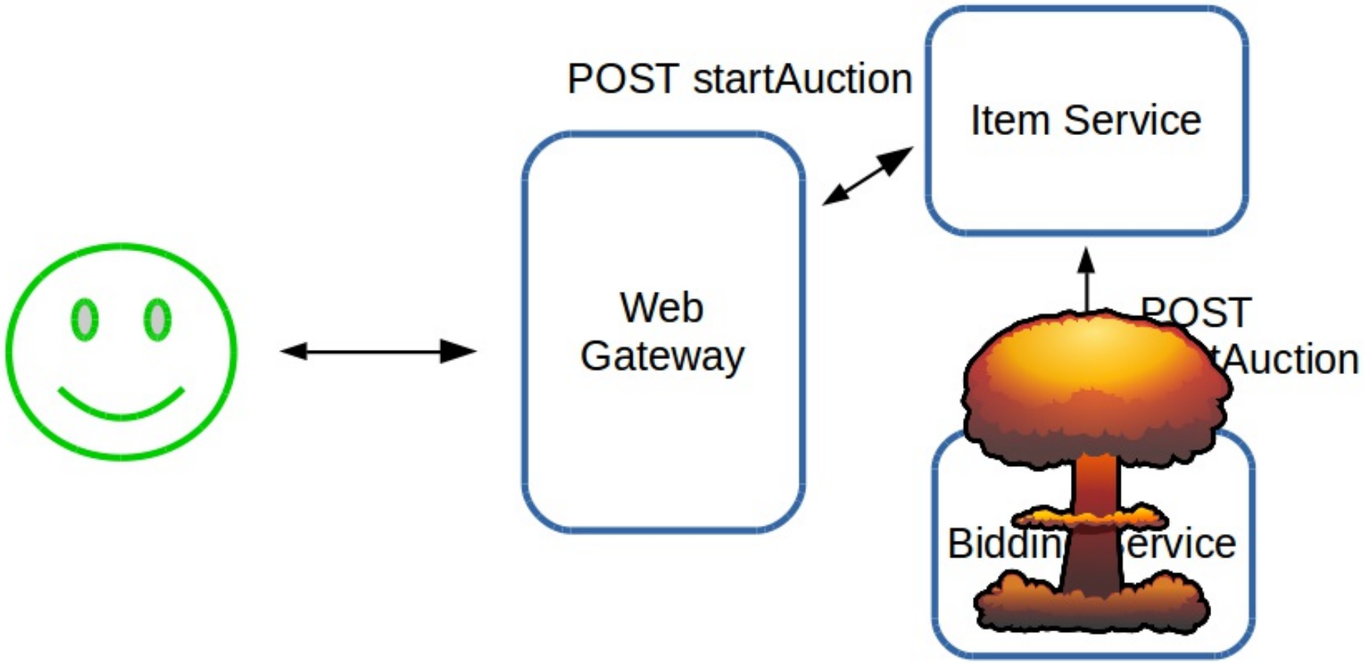
Bidding Service


POST startAuction
Item Service
Web
Gateway
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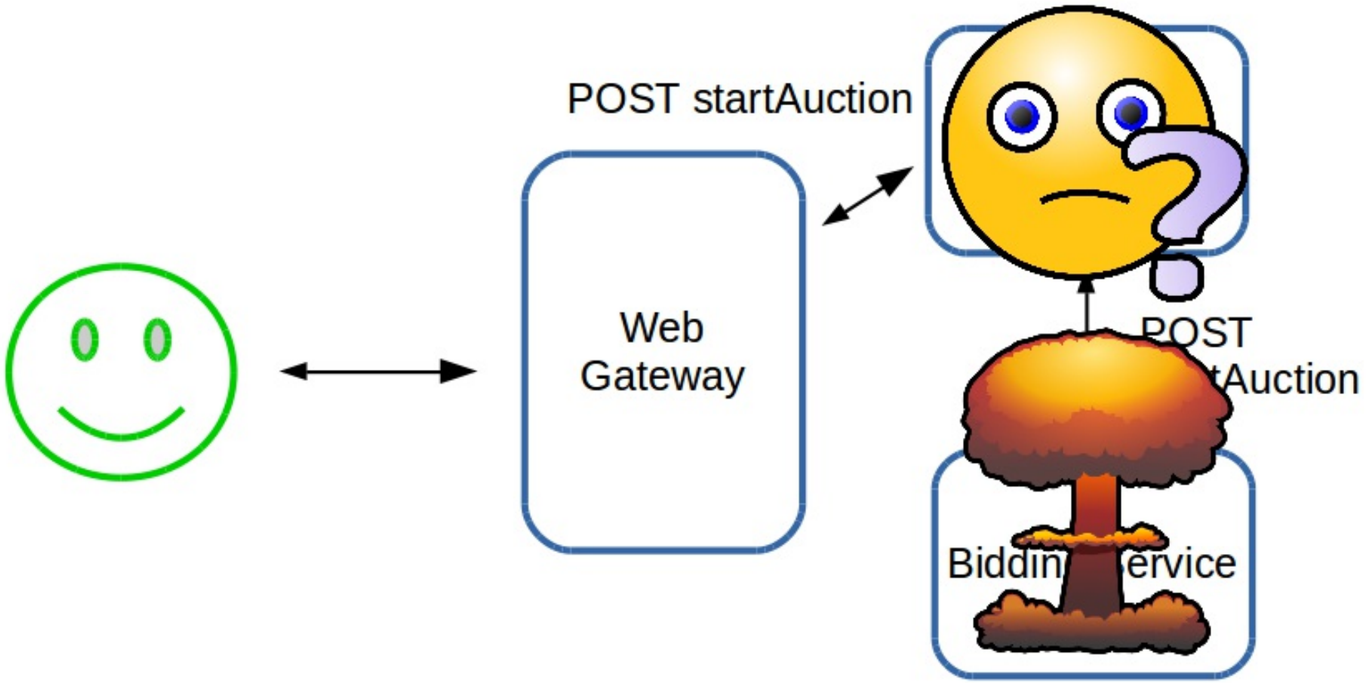
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Web
Gateway
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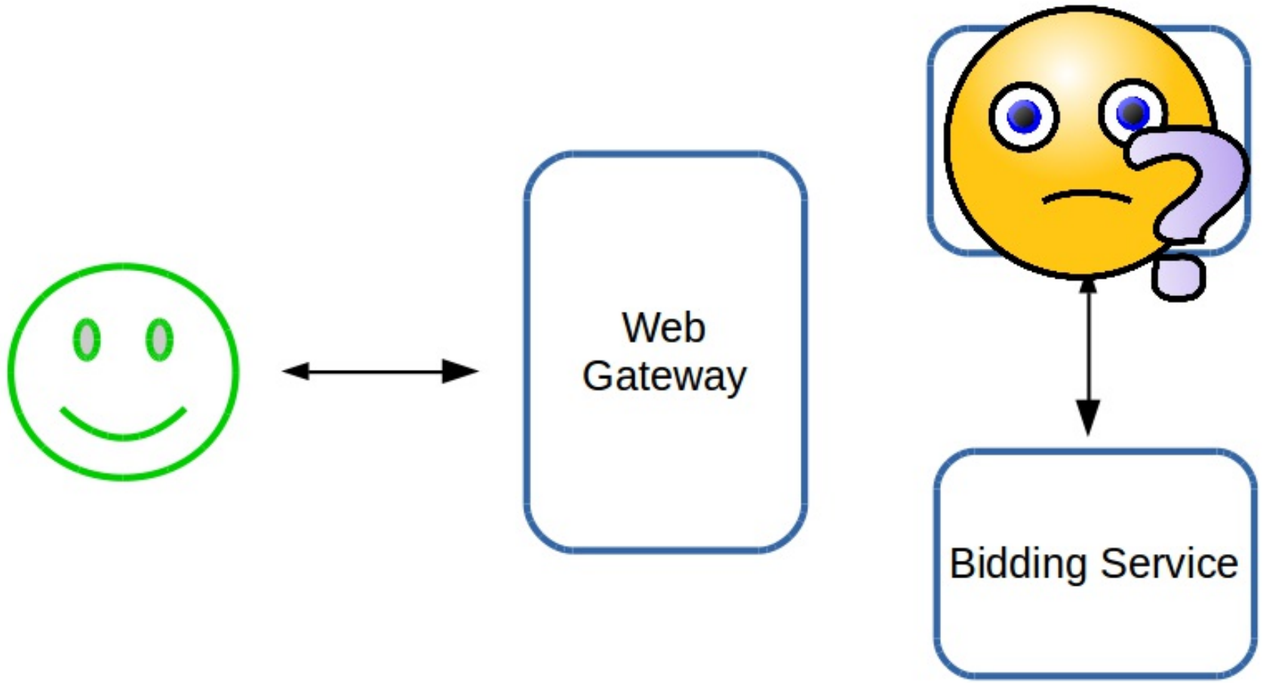
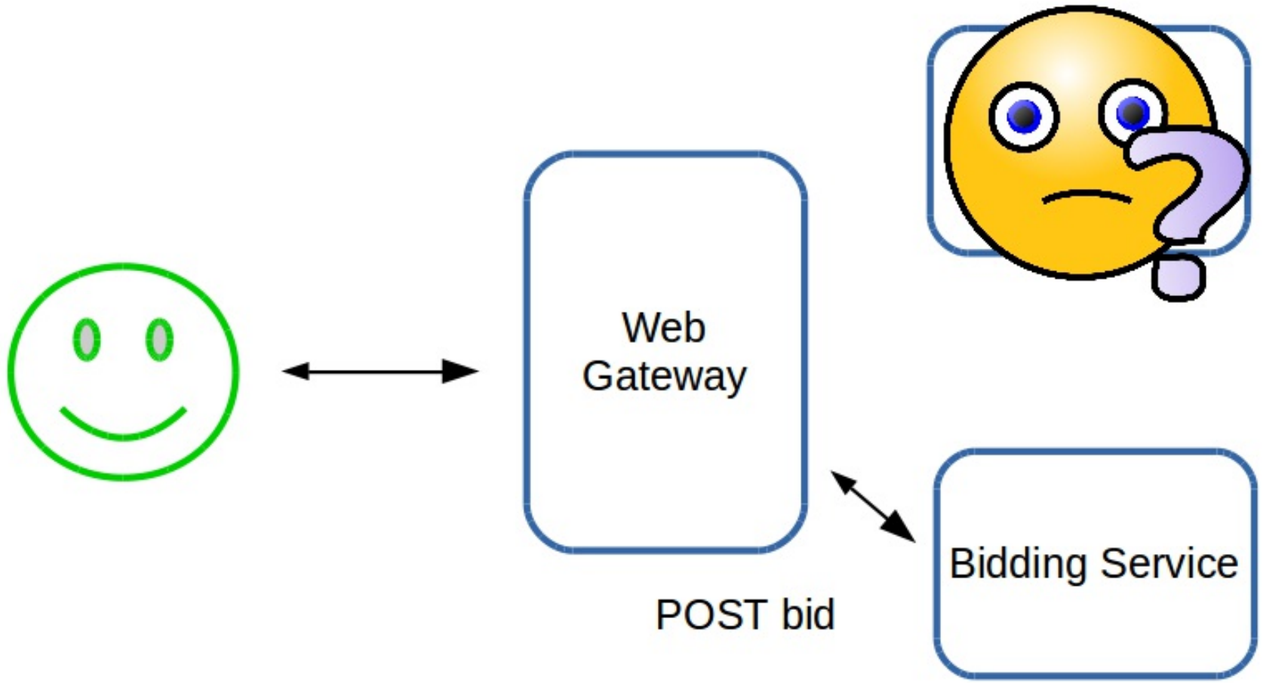
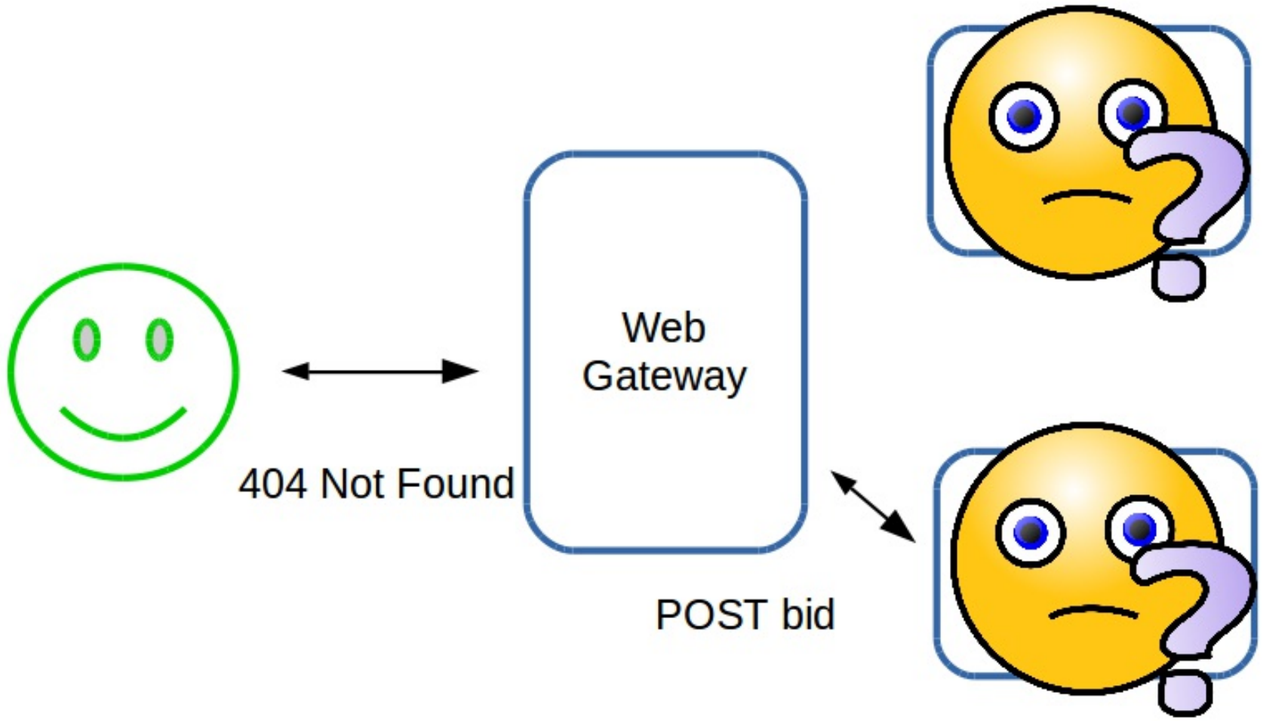
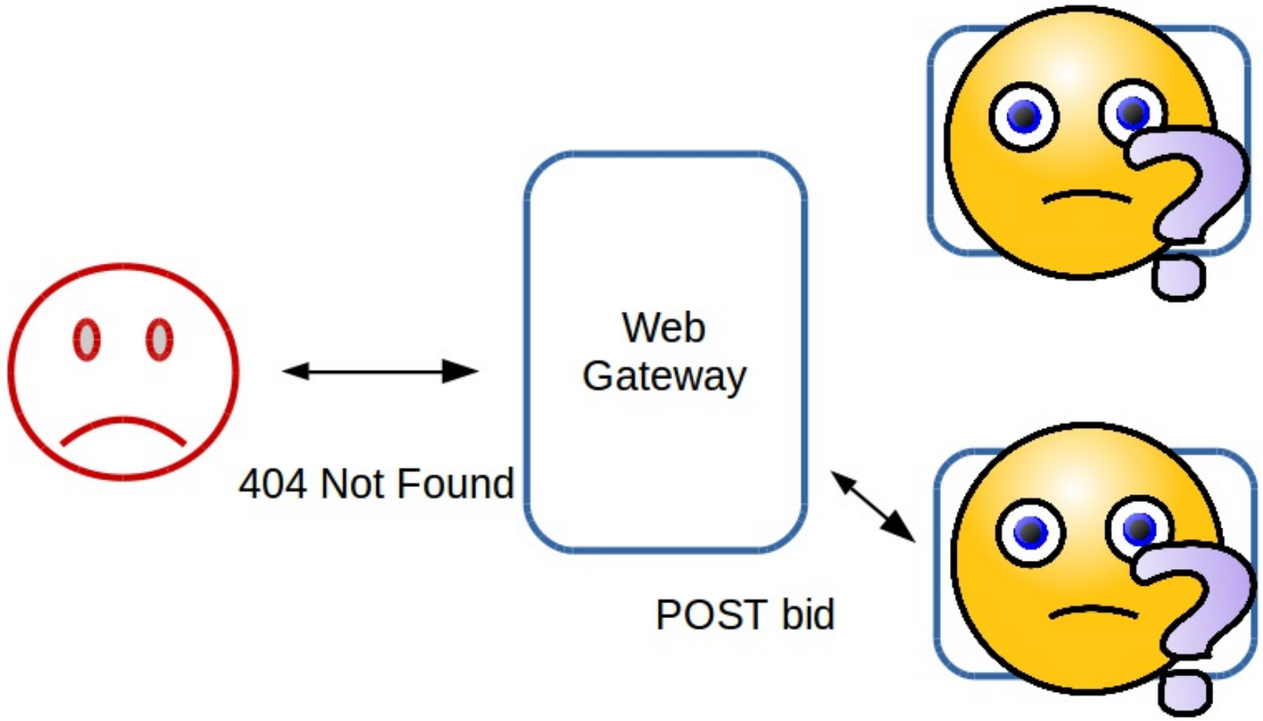
Biddin ervice


Web
Gateway
Bidding Service


Web
Gateway
Bidding Service
POST bid


Web
Gateway
404 Not Found
POST bid


Web
Gateway
404 Not Found
POST bid

INCONSISTENCY FROM FAILURE

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- Synchronous "at same time" communication of updates is dangerous

INCONSISTENCY FROM FAILURE

- Synchronous "at same time" communication of updates is dangerous
  - Transactions can't span service boundaries

PATTERN 3: ASYNCHRONOUS MESSAGING

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- Does not require both systems to be responsive

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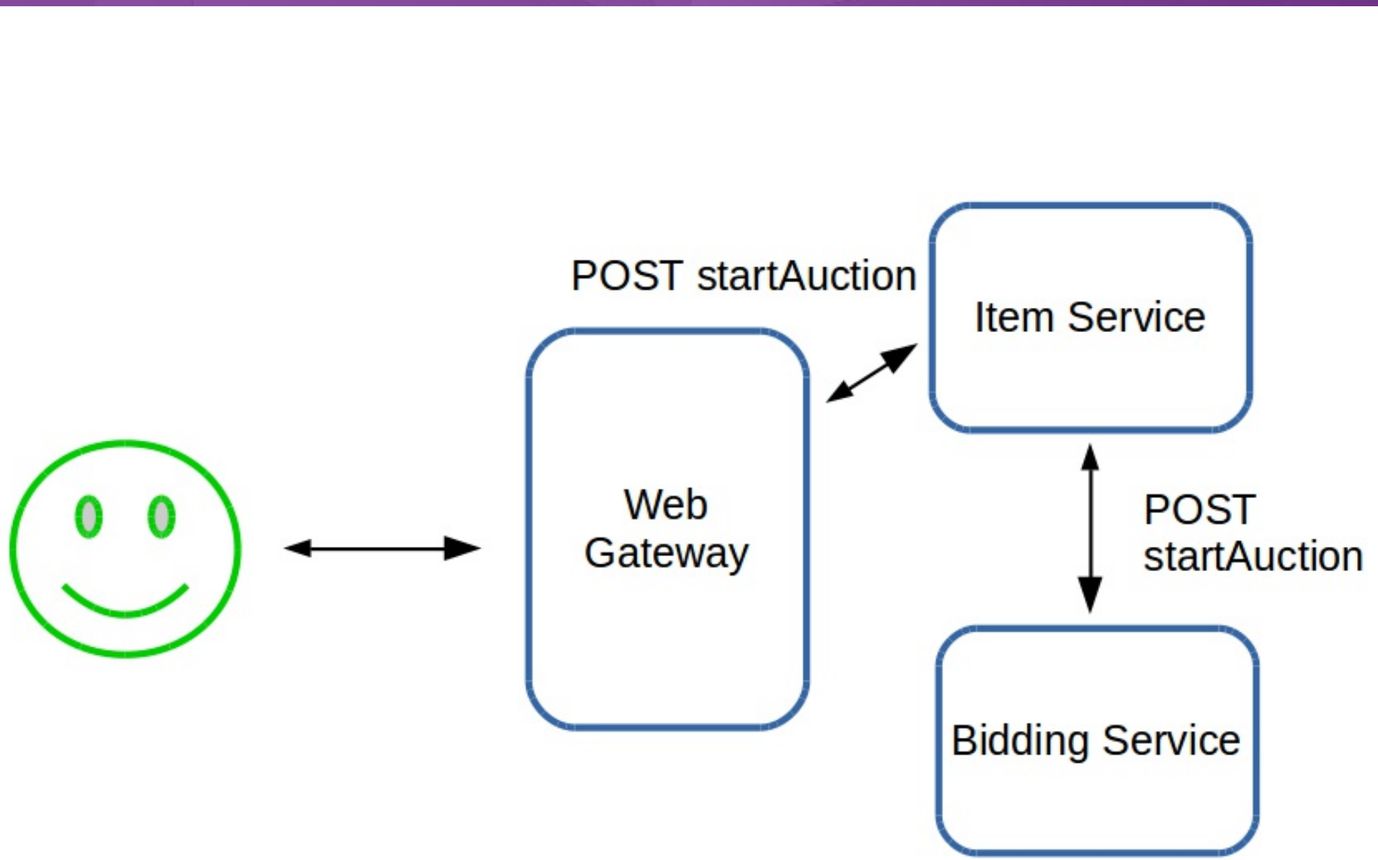
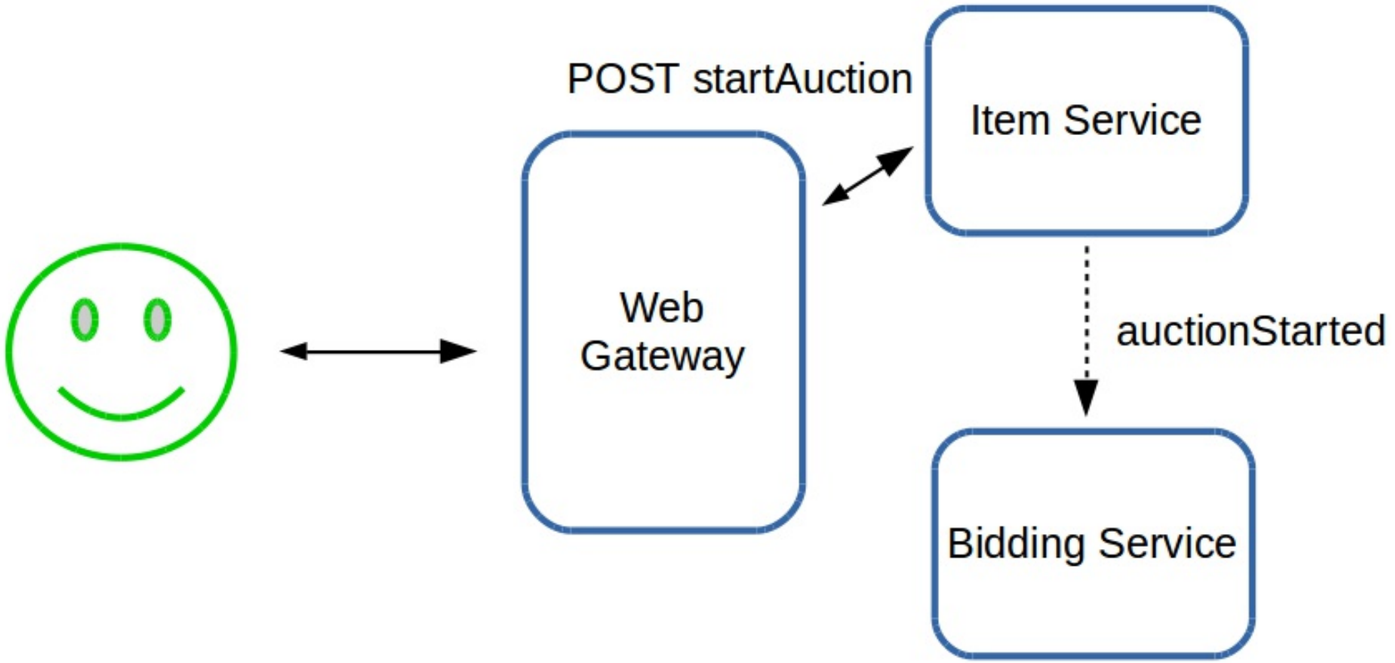
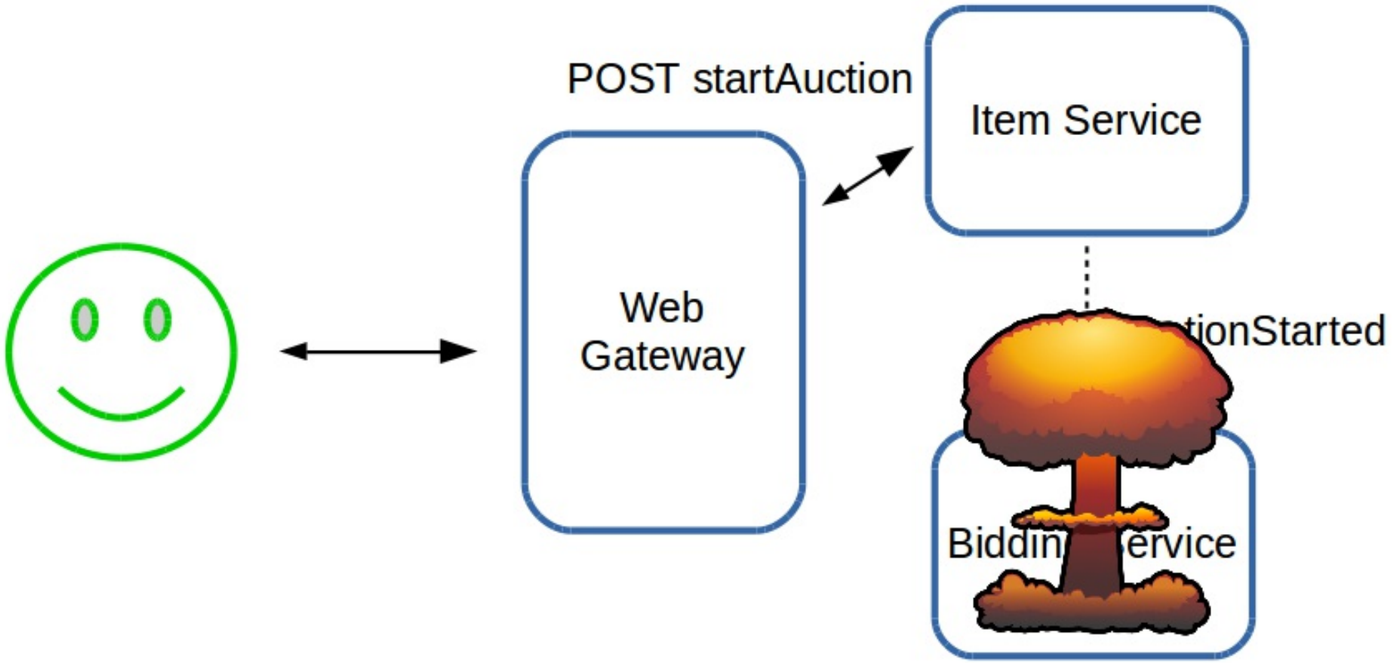
- Perfect if you already persist events

PATTERN 3: ASYNCHRONOUS MESSAGING

- Does not require both systems to be responsive
- Perfect if you already persist events
- Use persistent events as a source of messages


POST startAuction
Item Service
Web
Gateway
POST
startAuction
Bidding Service


POST startAuction
Item Service
Web
Gateway
auctionStarted
Bidding Service


POST startAuction
Item Service
Web
Gateway
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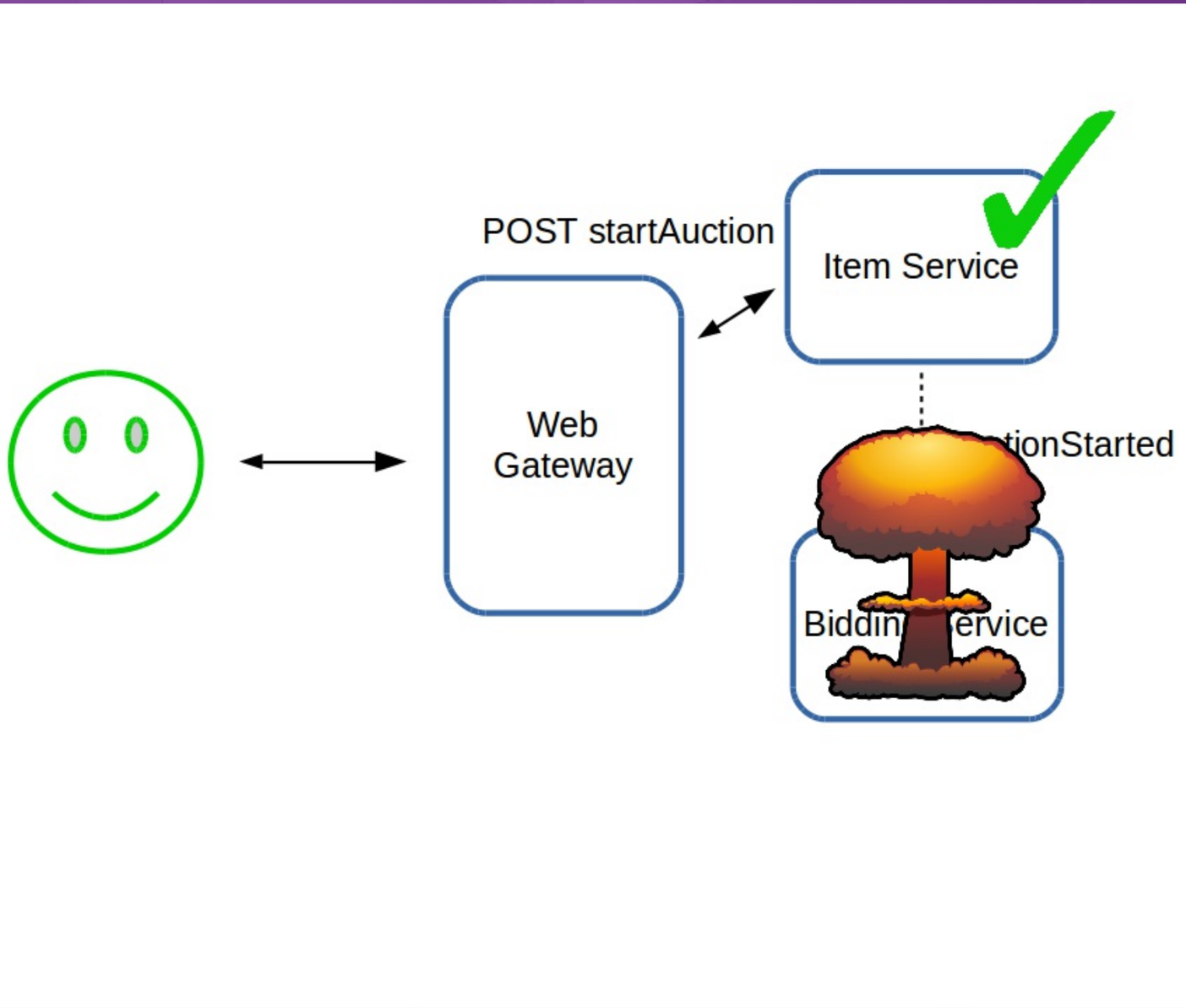
Biddin ervice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Item Service
Web
Gateway
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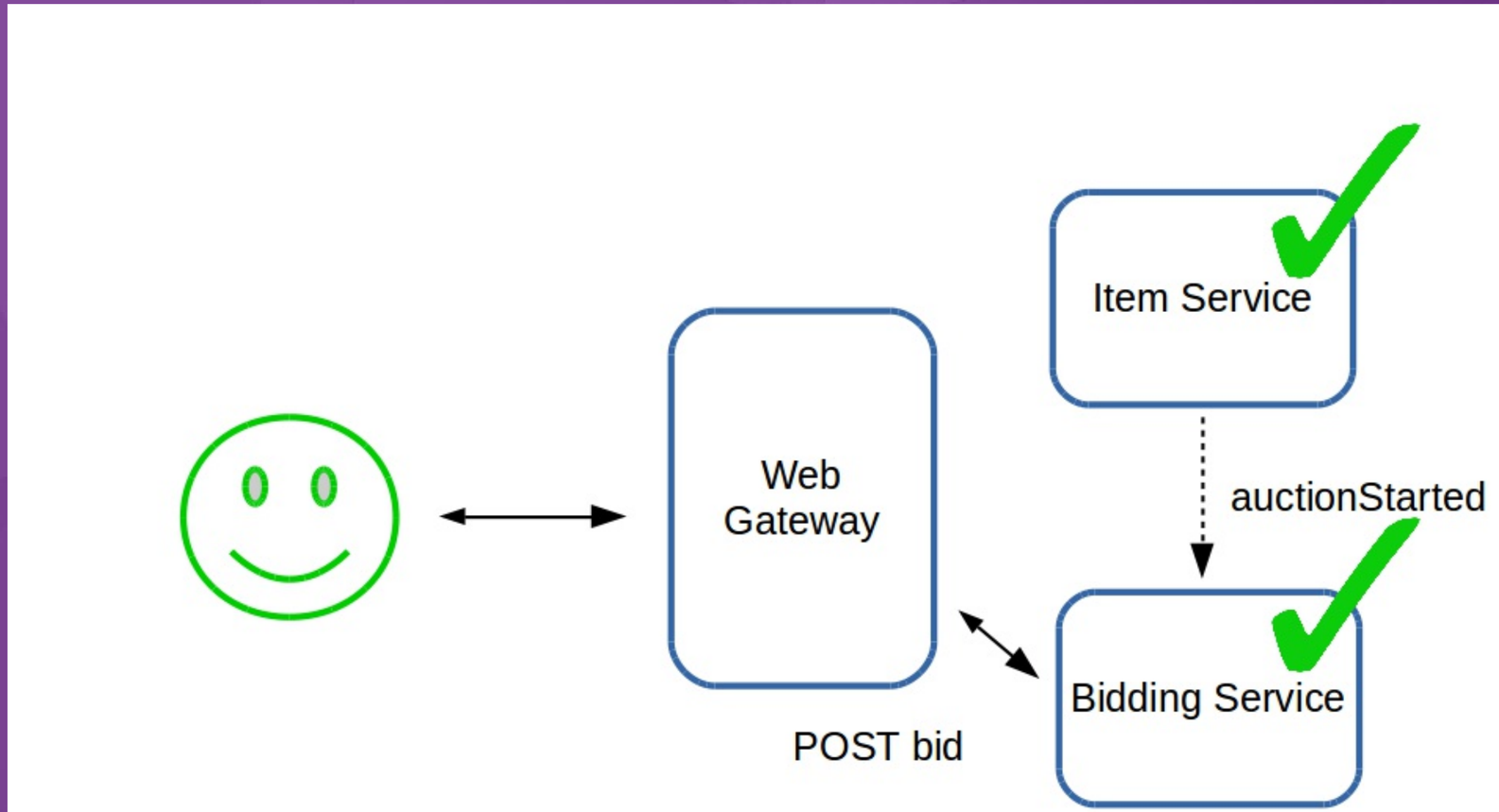
Biddin ervice


Item Service
Web
Gateway
auctionStarted
Bidding Service
POST bid

UNACCEPTABLE DEGRADATION

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- Earlier we degraded the item page with empty bid history

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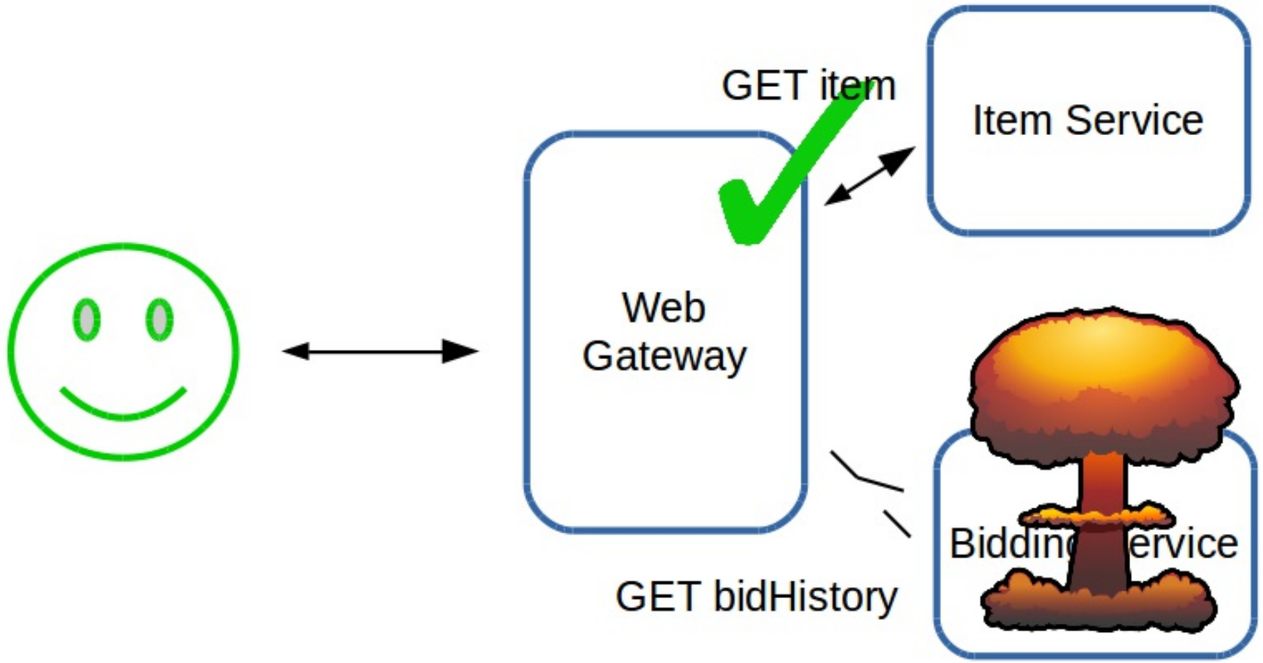
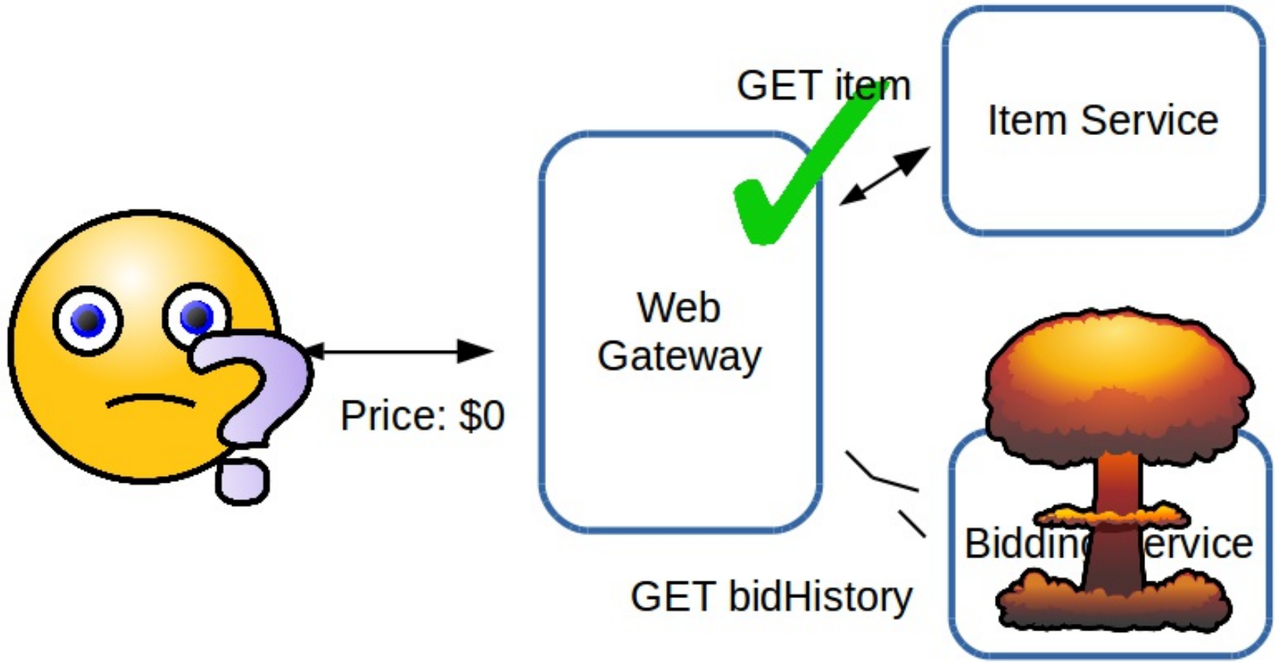
- Earlier we degraded the item page with empty bid history
- Price was also $0

UNACCEPTABLE DEGRADATION

- Earlier we degraded the item page with empty bid history
- Price was also $0
- Users may tolerate no history, but not wrong price


GET item
Item Service
Web
Gateway
GET bidHistory


GET item
Item Service
Web
Gateway
Price: $0
GET bidHistory

PATTERN 4: DENORMALIZE

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- Push important information to other services

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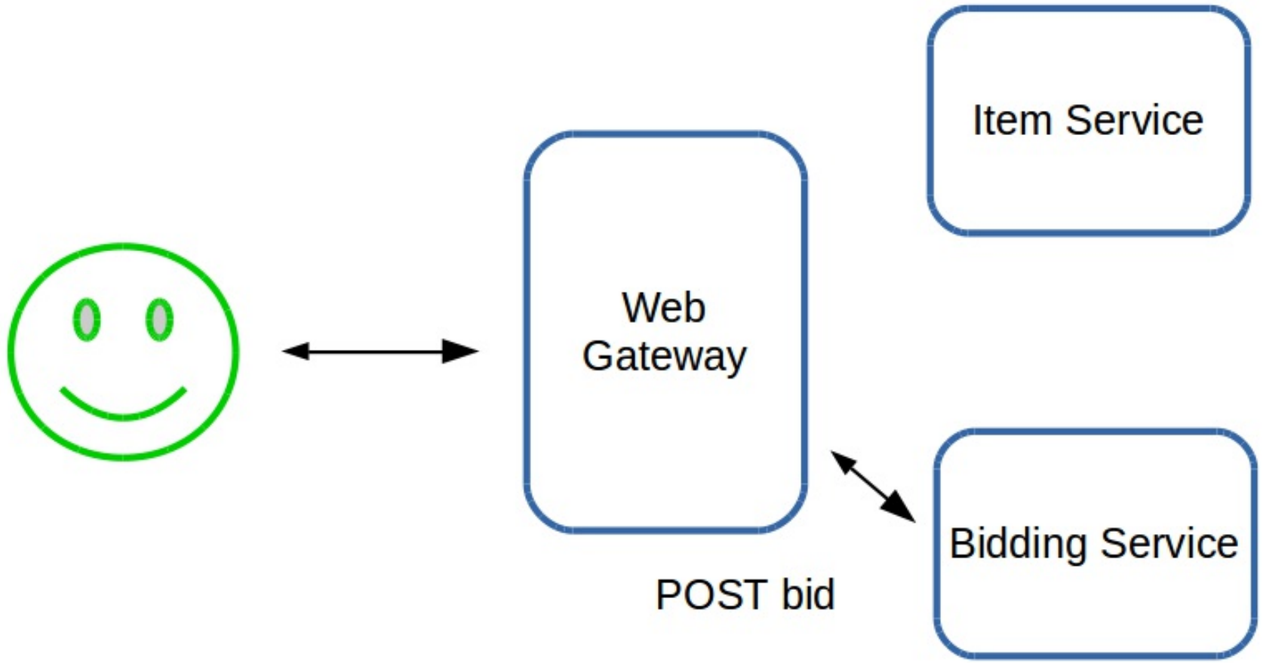
  - Important for system functions
  - Important for business functions
- Store duplicated information in those services
  - AKA denormalization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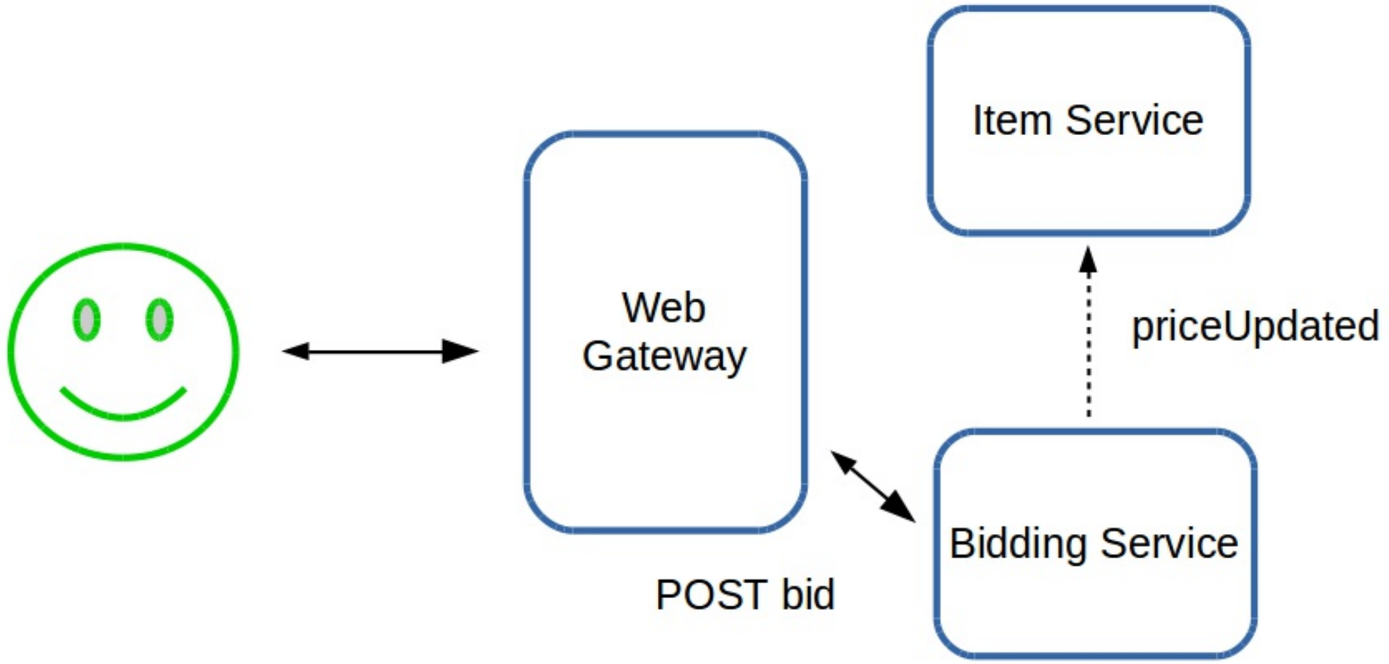
Web
Gateway
Bidding Service
POST bid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Web
Gateway
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Bidding Service
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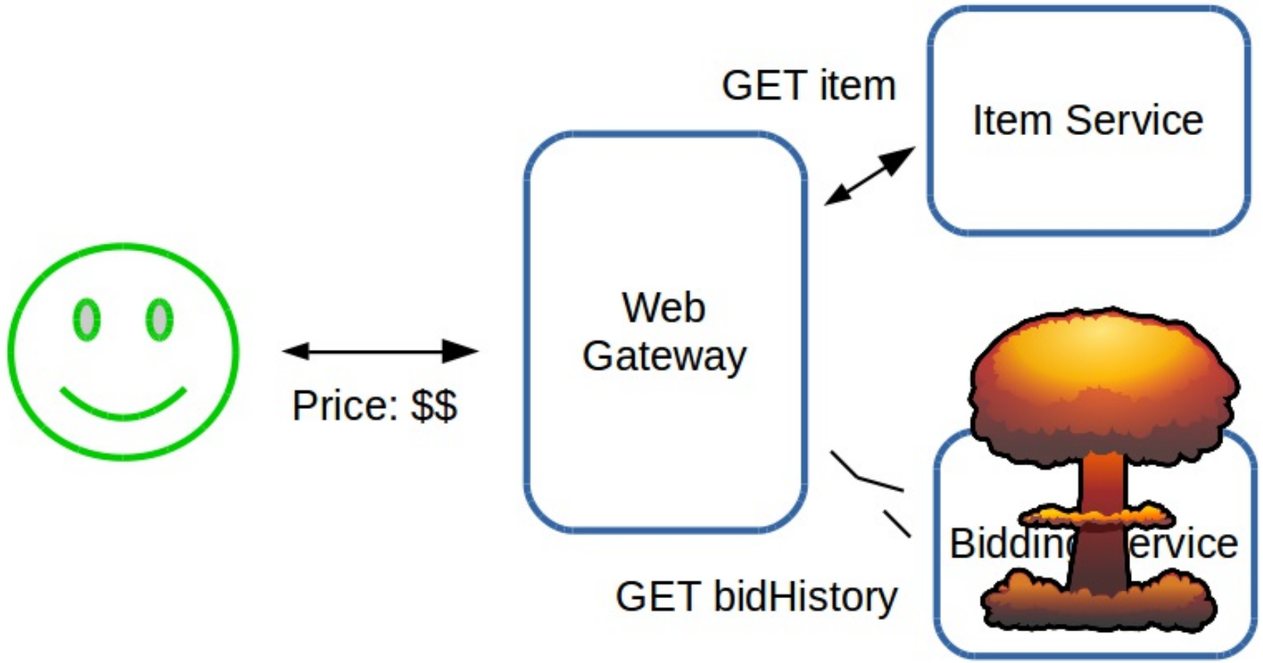
GET item
Item Service
Web
Gateway
Price: $$
GET bidHistory

SUMMARY

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- Failure and inconsistency must be managed
- Use:
  - Circuit breakers
  - Failure degradation
  - Asynchronous messaging
  - Denormalization

NEXT STEPS

http://lagomframework.com

https://github.com/jroper/microservices-architecture