ReST API Design: A Beginner's Guide

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Who am I?

- I am Janani!
- Product Architect, Detroit Labs
- Love to read and travel
- On my 2nd year of balcony gardening!

Agenda

- API and ReST
- API Design
- 6-step Process to ReST API Design
- Conclusion

What is an API?

Application Programming Interface

Exposes functionality

Usable interface

Examples: Collections from Java's Utils library, APIs by OpenWeatherMap

What is ReST?

Representational State Transfer

Architectural concept

Client–server

Cacheable

Uniform Interface

Stateless

Layered system

Introduced by Roy Fielding in 2000

Allows building scalable, distributed systems

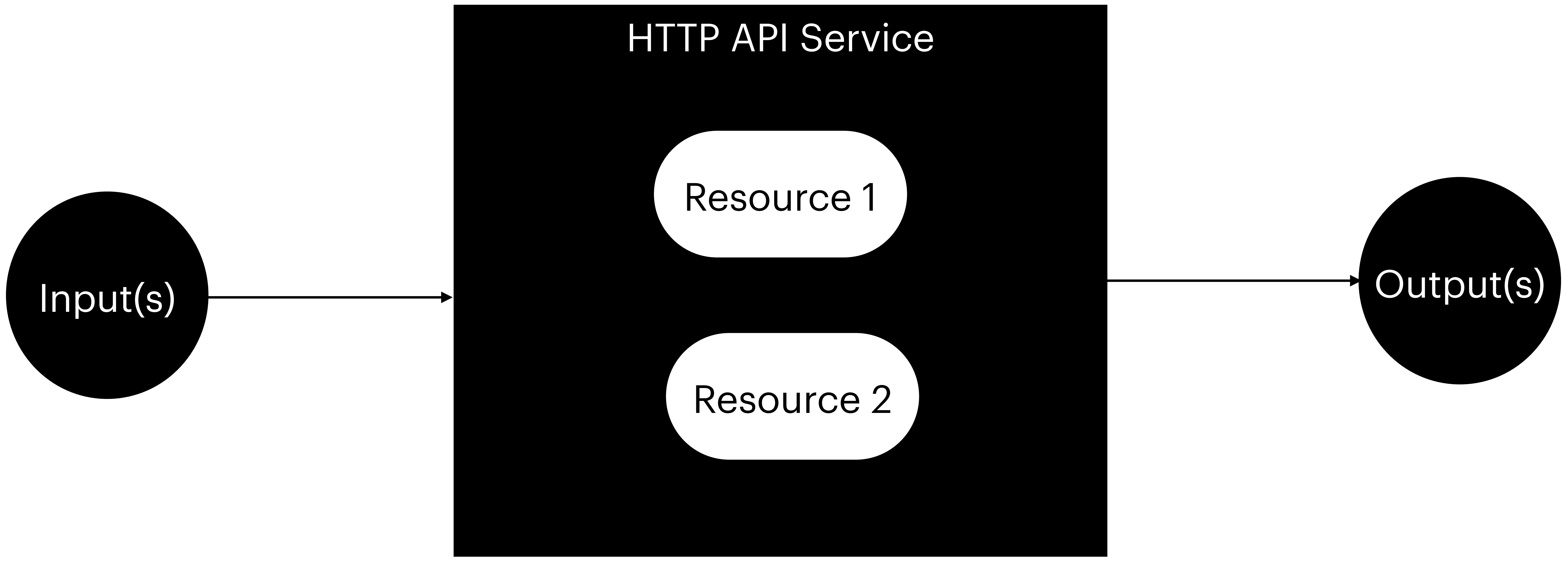
ReST & HTTP

ReST does not dictate protocol

HATEOS: Hypermedia As The Engine of Application State

Today, we are going to be building an **HTTP API Service**

HTTP API Design: What?



HTTP API Design: For?

Developers

- Building the API
- Consuming the API

Other roles

- Designers
- Managers
- Quality Engineers etc

HTTP API Design: When?

- Starts pre-development
- Continues alongside development work
- Iteratively improved

6-step Process to HTTP API Design

- API Naming
- HTTP Verbs
- Request Body
- Response Status
- Response Body
- Path vs Query Params

Step 1: API Naming

API Naming

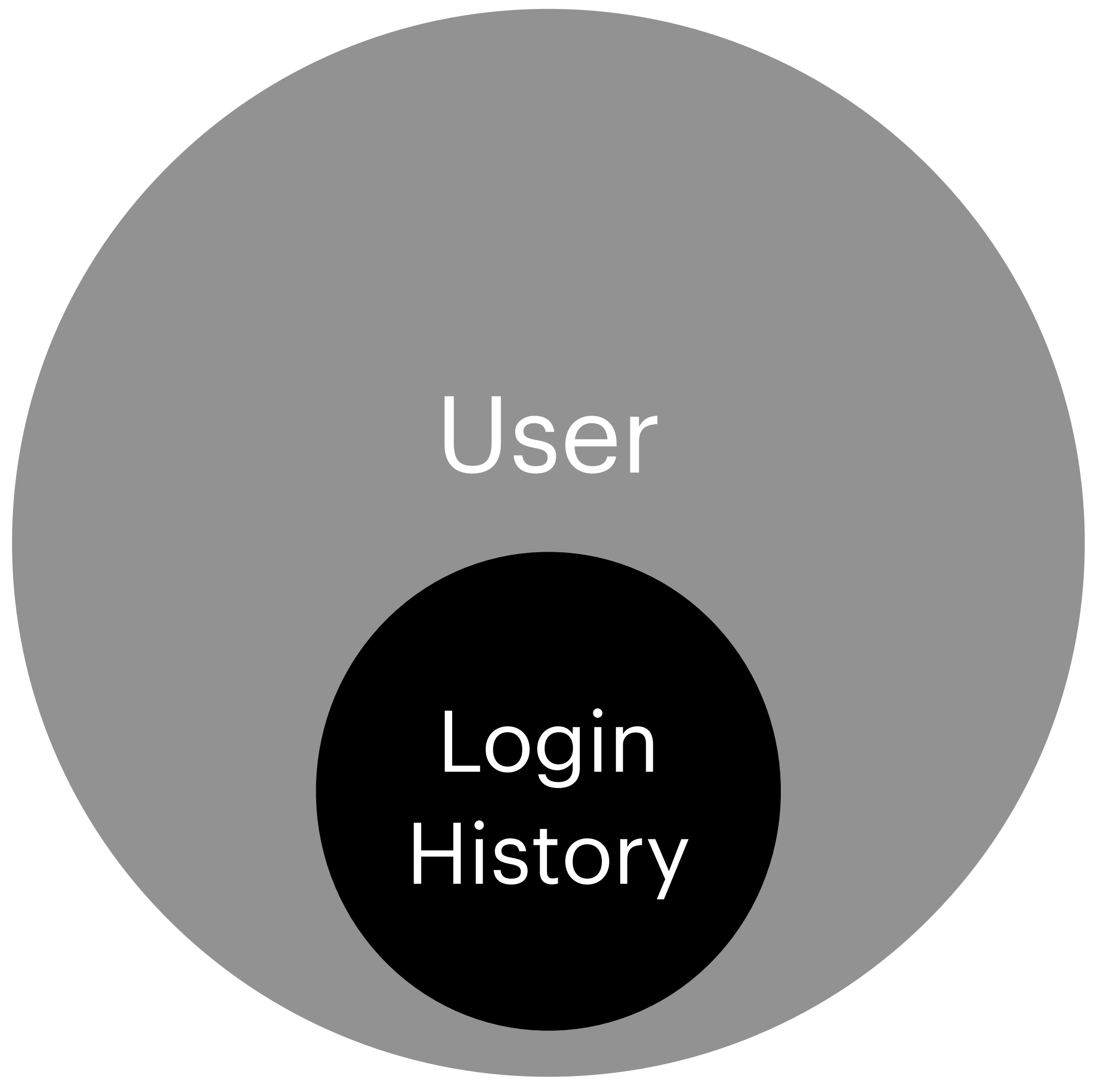
Identify the resource

- What is this API for?
- Does it belong to another resource?

Consistent URI naming

- Camel case
- Hyphenated

API Naming: Example



/users/{userId}/loginHistories

/users/{userId}/loginHistories/{loginHistoryId}

6-step Process to HTTP API Design

- ~~API Naming~~
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Step 2: HTTP Verbs

HTTP Verbs

Operations

- C: Create (POST)
- R: Read (GET)
- U: Update (PUT)
- D: Delete (DELETE)

Identify allowed operations

Pick the Verb!

HTTP Verbs: HEAD & PATCH

HEAD

~ GET

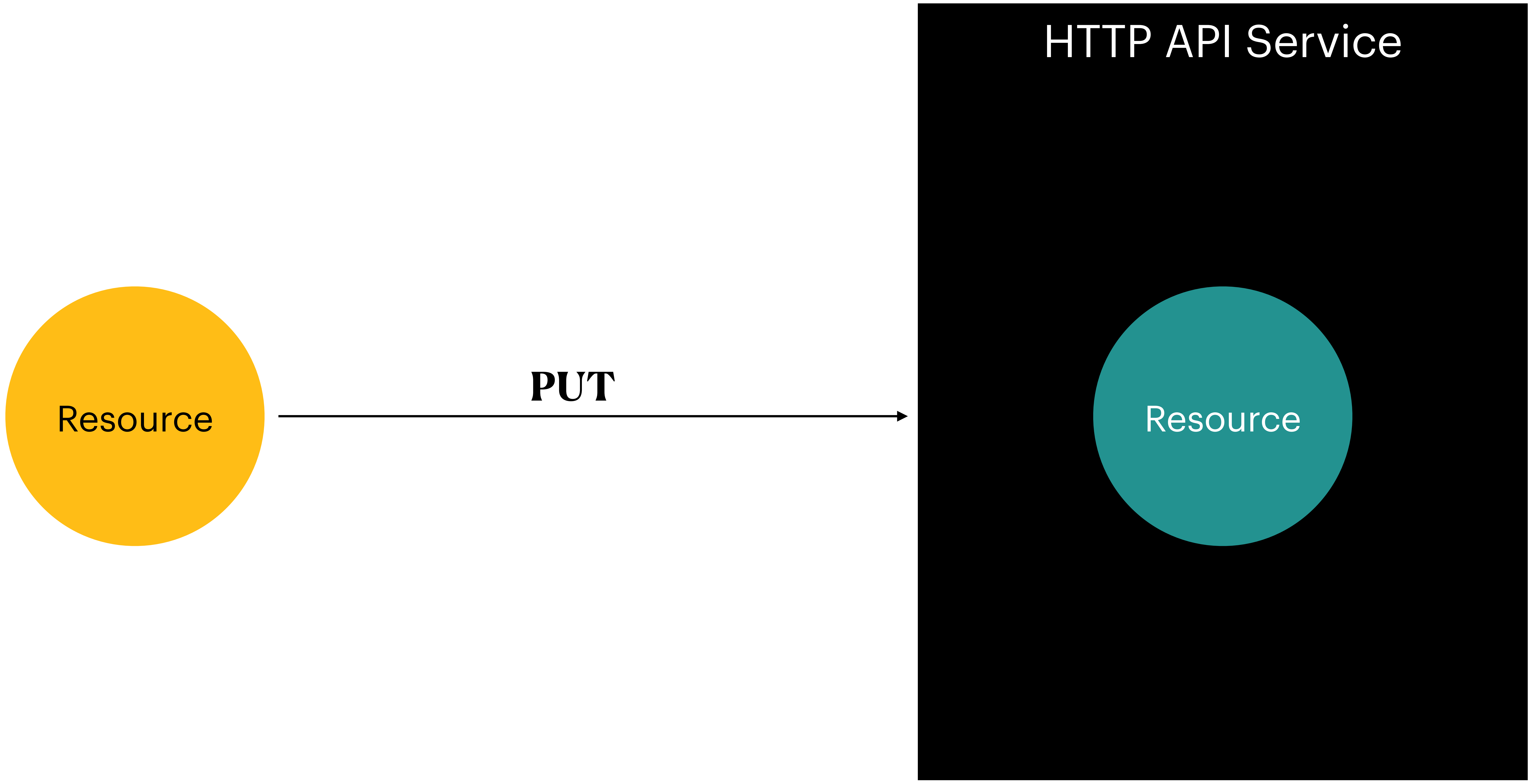
Metadata about the data

PATCH

~ PUT

Modifies the resource

HTTP Verbs: PUT vs PATCH



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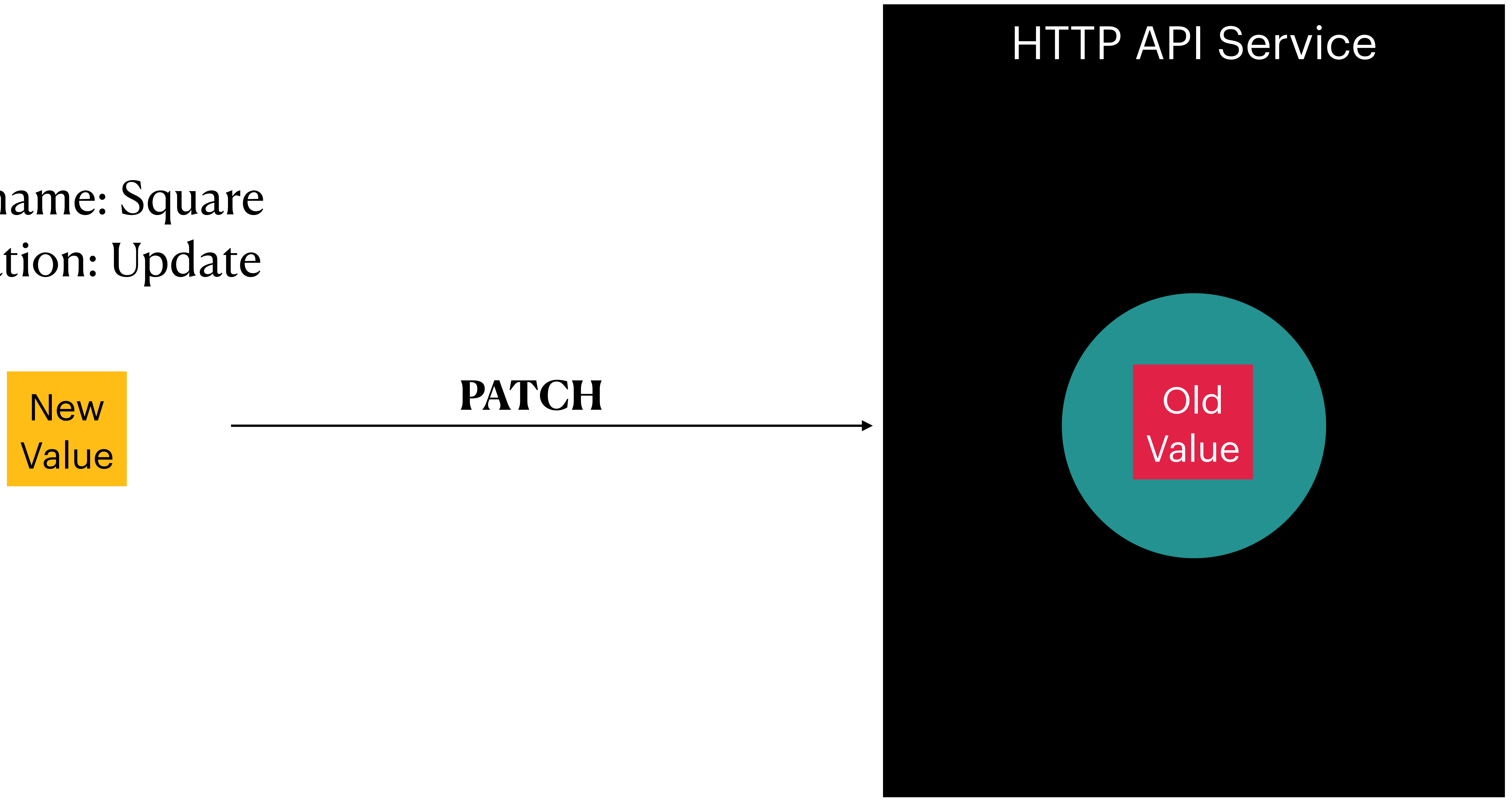
HTTP Verbs: PUT vs PATCH

Field name: Square
Operation: Update



HTTP Verbs: Example

Immutable: Only read & create

GET
/users/{userId}/loginHistories/{loginHistoryId}

GET
/users/{userId}/loginHistories

POST
/users/{userId}/loginHistories

~~PUT~~ ~~PATCH~~ ~~DELETE~~

6-step Process to HTTP API Design

- ~~API Naming~~
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Step 3: Request Body

Request Body

Is request body needed?

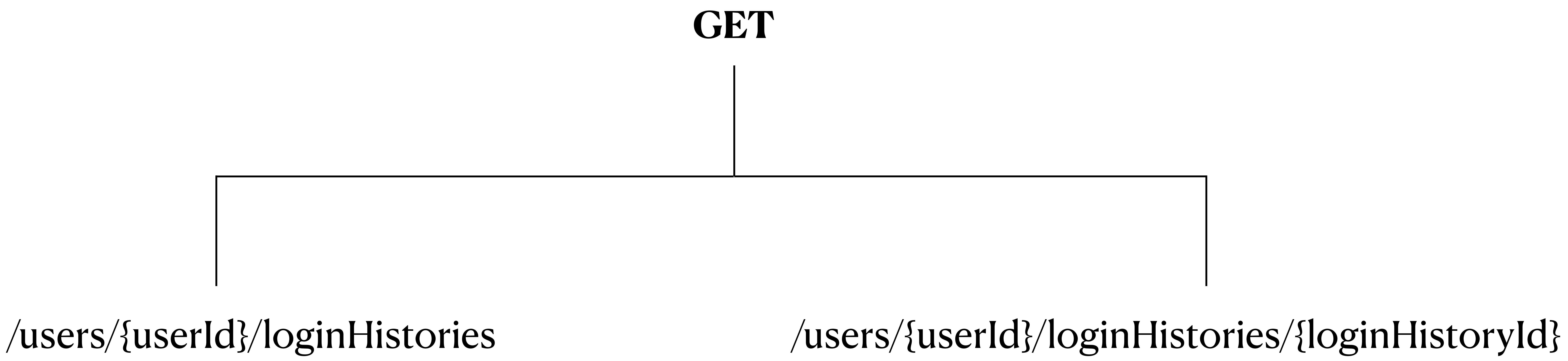
RFC recommendations

Format (JSON/XML/Text)

Request body structure

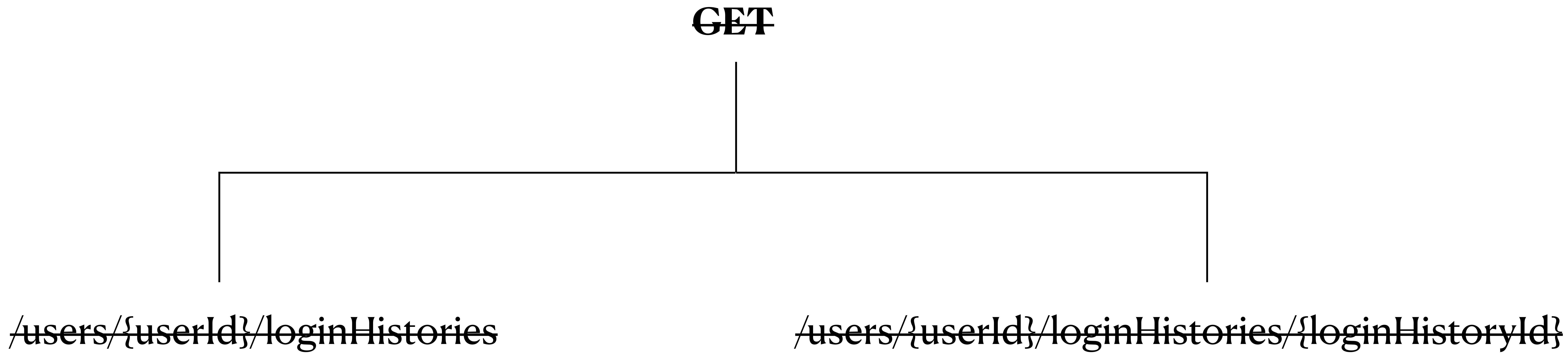
- What is needed to perform the operation
- Validations
- Avoid duplicating request components

Request Body: Example (GET)


GET
/users/{userId}/loginHistories
/users/{userId}/loginHistories/{loginHistoryId}

Does the operation need a request body? **No**

Request Body: Example (GET)


~~GET~~
~~/users/{userId}/loginHistories~~
~~/users/{userId}/loginHistories/{loginHistoryId}~~

Request Body: Example (POST)

POST

/users/{userId}/loginHistories

Does the operation need a request body? **Yes**

Request Body: Example (POST)

POST

/users/{userId}/loginHistories

Does the RFC recommends it? **Yes**

Request Body: An example (POST)

POST

|

/users/{userId}/loginHistories

Format: **Json**

Request Body: An example (POST)

POST

|

/users/{userId}/loginHistories

```
{
  "device": "iPhone",
  "time": "1608739241",
  "registeredDevice": true,
  "ipAddress": "000.000.00.000",
  "location": "Detroit, MI, USA"
}
```

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6-step Process to HTTP API Design

- ~~API Naming~~
- ~~HTTP Verbs~~
- ~~Request Body~~
- Response Status
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Step 4: Response Status

Response Status

- Did the operation succeed?
- Next steps (if any)?

Response Status

Error Status Code

- 4xx
- 5xx

Success Status Code

- 200
- 201
- 204

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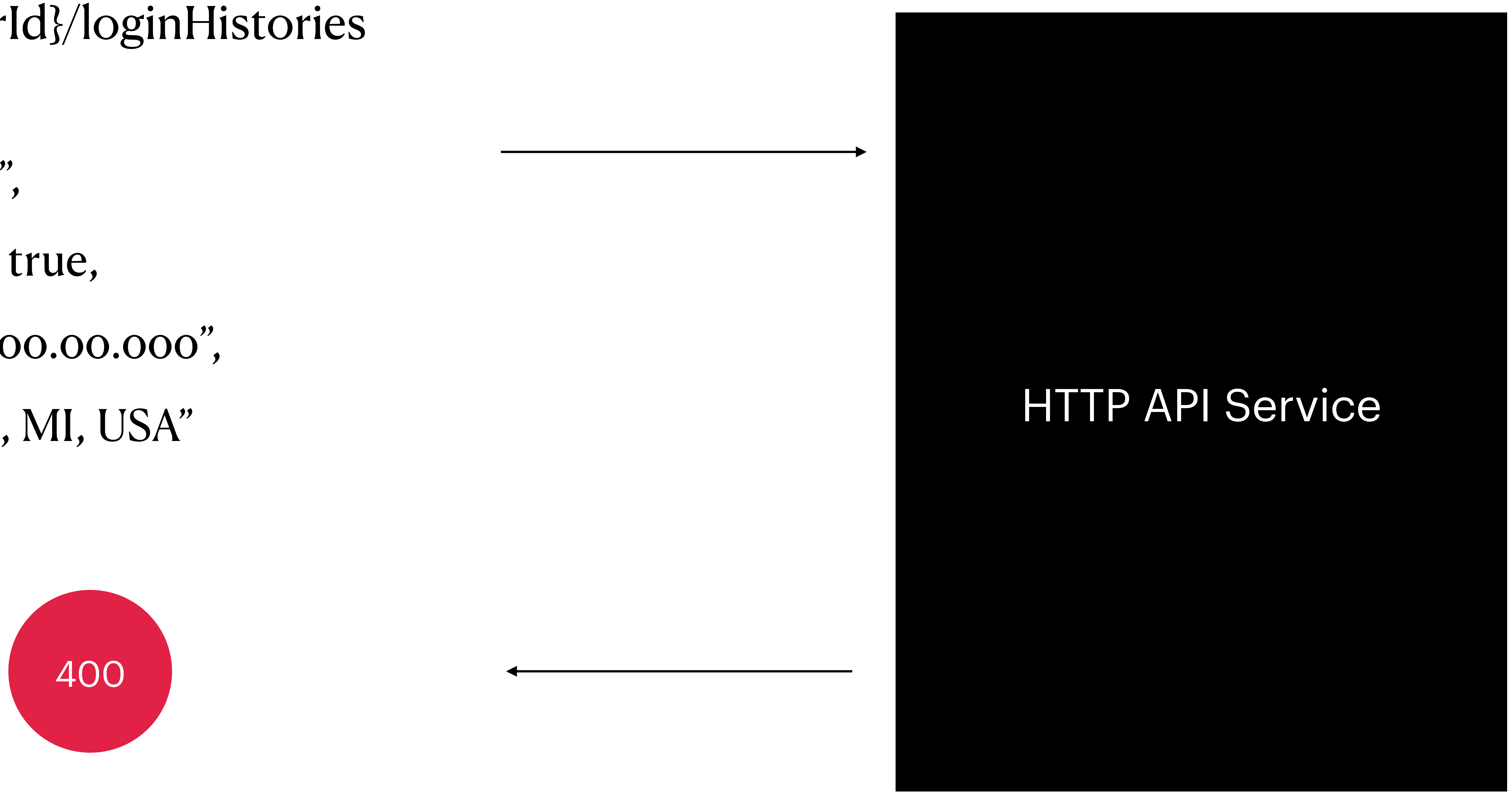
Response Status: Example (Error)

POST /users/{userId}/loginHistories

```
{
    “time”: “1608739241”,
    “registeredDevice”: true,
   “ipAddress”: “000.000.00.000”,
    “location”: “Detroit, MI, USA”
}
```



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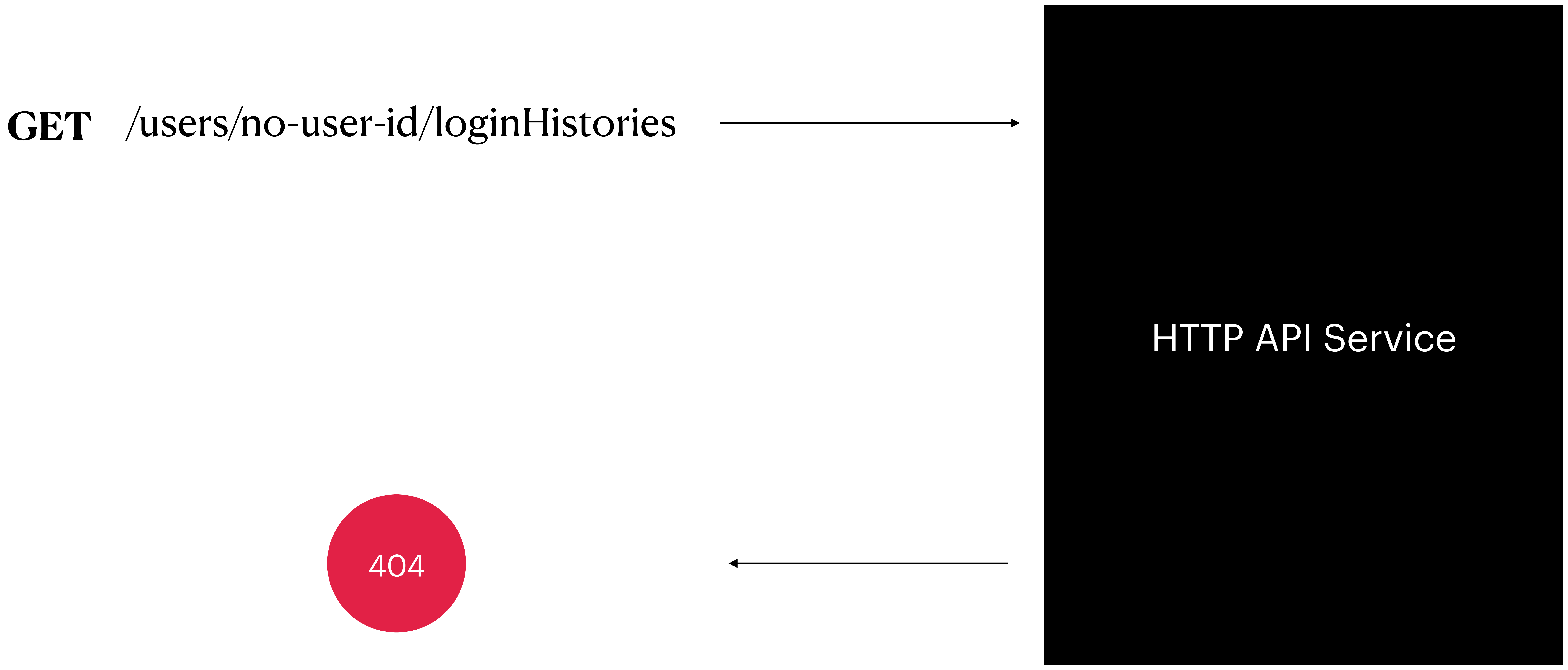
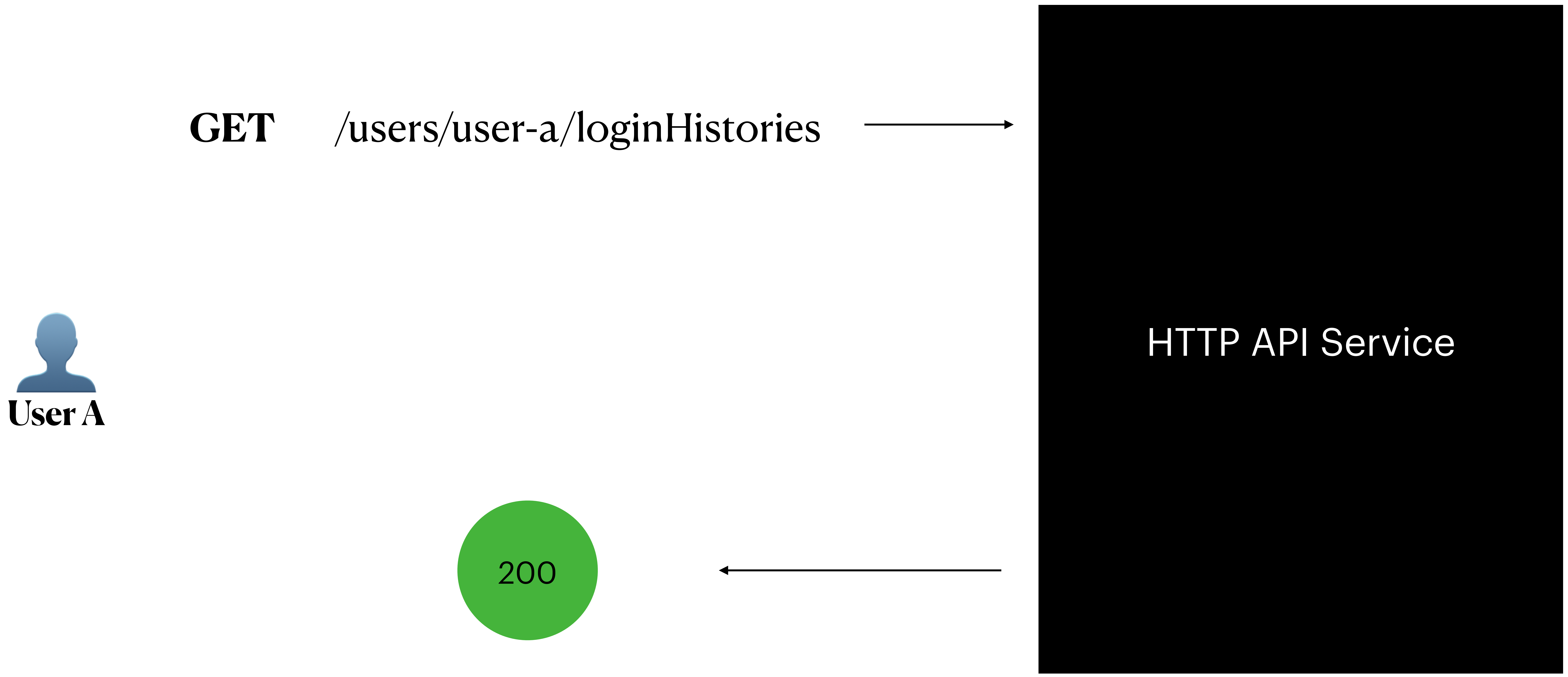
Response Status: Example (Error)



Response Status: Example (Success)



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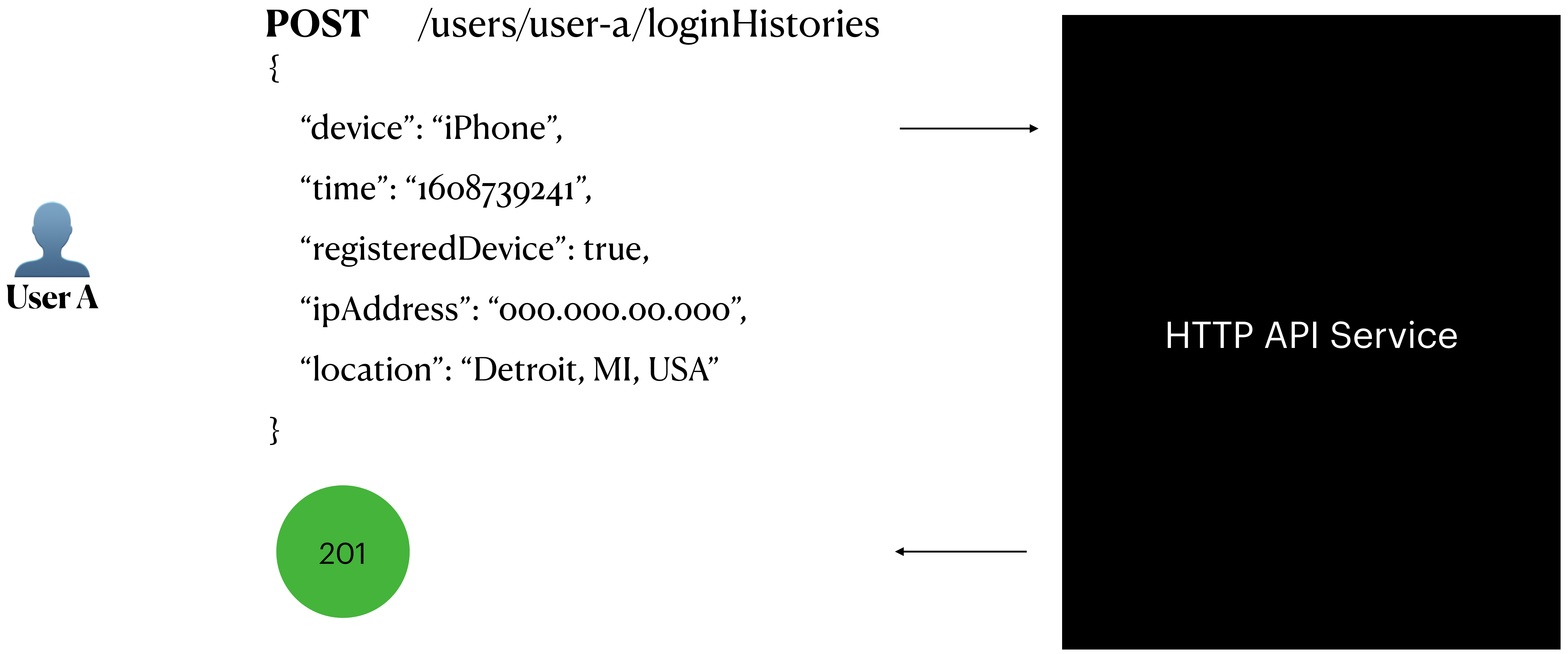
Response Status: Example (Success)



```
POST     /users/user-a/loginHistories
{
    “device”: “iPhone”,
    “time”: “1608739241”,
    “registeredDevice”: true,
    “ipAddress”: “000.000.00.000”,
    “location”: “Detroit, MI, USA”
}
```

6-step Process to HTTP API Design

- ~~API Naming~~
- ~~HTTP Verbs~~
- ~~Request Body~~
- ~~Response Status~~
- Response Body
- Path vs Query Params

Step 5: Response Body

Response Body

- Should be on par with the status
- Decide what informations needs to be sent back
- Break up responses (even if it means additional APIs)

Response Body: Example (GET ALL)

```
[
  {
    “id”: “1”,
    “device”: “iPhone”,
    “time”: “1608739241”
  },
  {
    “id”: “2”,
    “device”: “iPhone”,
    “time”: “1608739241”
  },
  ...
]
```

Response Body: Example (GET ONE)

```
{
    “device”: “iPhone”,
    “time”: “1608739241”,
    “registeredDevice”: true,
    “ipAddress”: “000.000.00.000”,
    “location”: “Detroit, MI, USA”
}
```

Response Body: An example (POST)

```
{
    “id”: “1”,
    “device”: “iPhone”,
    “time”: “1608739241”,
    “registeredDevice”: true,
    “ipAddress”: “000.000.00.000”,
    “location”: “Detroit, MI, USA”
}
```

6-step Process to HTTP API Design

- ~~API Naming~~
- ~~HTTP Verbs~~
- ~~Request Body~~
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- ~~Response Body~~
- Path vs Query Params

Step 6: Path vs Query Params

Path vs Query Parameter

- Path Parameter
    - Unique resource identifiers
    - Nested appropriately

- Query Parameter
    - Search
    - Sort
    - Pagination

Path vs Query Parameter: Example

Path Variable

- Unique Identifier

GET /users/{userId}/loginHistories

GET /users/{userId}/loginHistories/{loginHistoryId}

Path vs Query Parameter: Example

Query Parameters

- Search — **GET** /users/{userId}/loginHistories?device= iPhone
- Sort — **GET** /users/{userId}/loginHistories?asc= time
  GET /users/{userId}/loginHistories?desc= time
- Pagination — **GET** /users/{userId}/loginHistories?page=2

What is next?

Security

Headers

Conclusion

- API, ReST & API Design
- 6-Step Process
  - API Naming
  - HTTP Verbs
  - Request Body
  - Response Status
  - Response Body
  - Path vs Query parameters
- The RFC is your friend (https://tools.ietf.org/html/rfc7231)

Thank you!