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Southampton
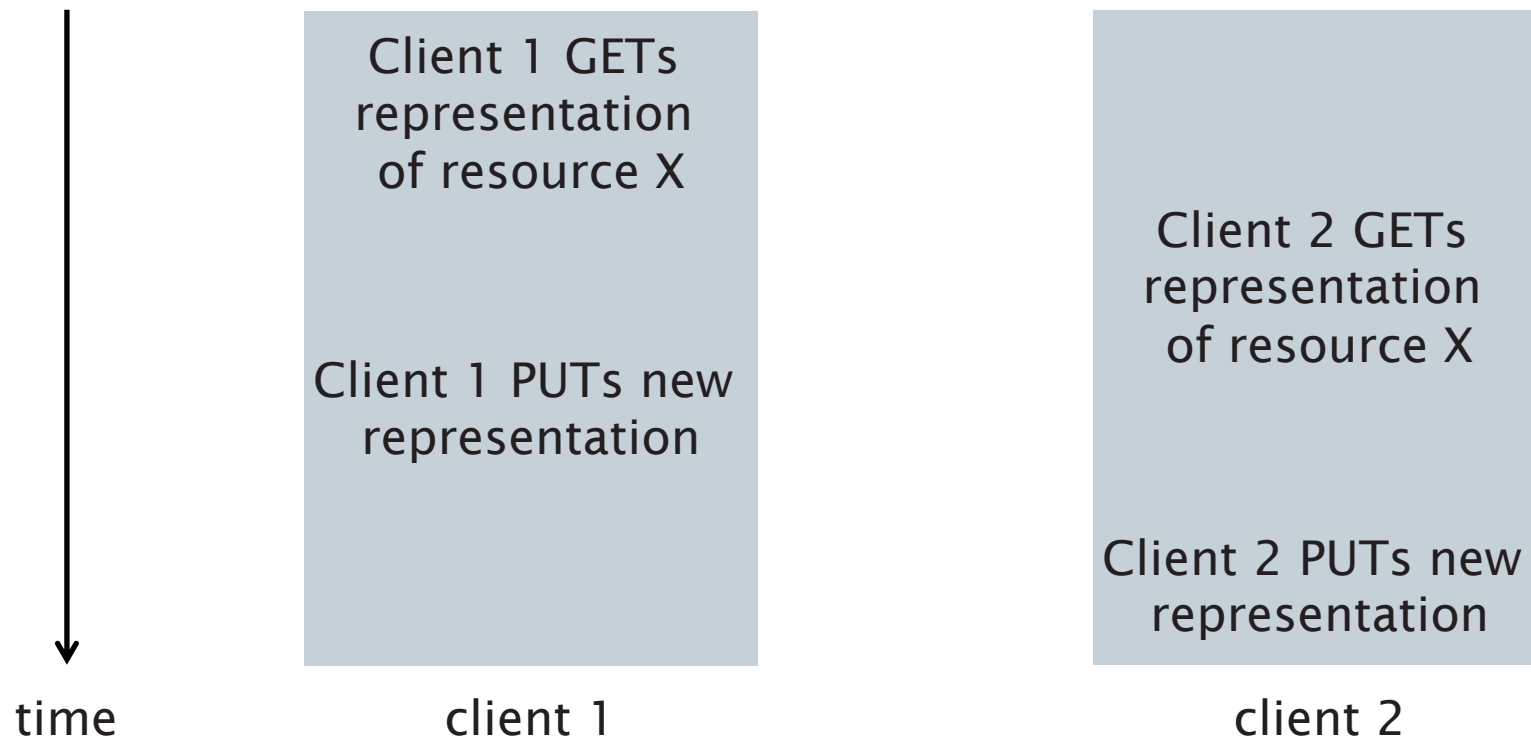
Conditional Requests

COMP3220 Web Infrastructure

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The Lost Update problem

If two or more clients are modifying a resource at the same time, how do we avoid *lost updates*?

Client 1 GETs
representation
of resource X

Client 1 PUTs new
representation

Client 2 GETs
representation
of resource X

Client 2 PUTs new
representation

time   client 1   client 2

Conditional requests

Some HTTP methods are *unsafe*; they alter the state of resources

Lost updates occur only when carrying out unsafe methods
- Avoid by checking to see whether the state of a resource (i.e. its representation) has changed between the GET and the PUT

Can also be used to avoid unnecessary safe methods

Comparison of representations in terms of validators that describe resource versions
- Strong validation: checks whether representations are byte-for-byte identical
- Weak validation: checks whether representations contain "the same content"

Entity tags

Entity tags are identifiers for resource versions (can be weak or strong)

Supplied by the server using the ETag: header:

- `ETag: "38be-5af769c088685"`   - a strong entity tag
- `ETag: w/"0023"`   - a weak entity tag (denoted by the "W/")
- `ETag: *`   - an entity tag matching any resource

`If-Match: `*`<etag>, <etag>, ...`*

- Only carry out the operation if the resource entity tag matches one of those listed
- If no matches, return 412 `Precondition Failed`

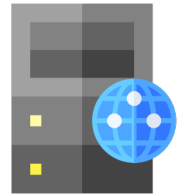`If-None-Match: `*`<etag>, <etag>, ...`*

- Only carry out the operation if the resource entity tag does not match any of those listed
- If matches, return 304 `Not Modified` for safe methods, or 412 `Precondition Failed` for unsafe methods

GET / HTTP/1.1
Host: www.example.com

HTTP/1.1 200 OK
Content-Type: text/html
ETag: "39d5-5943f8fdc2607"
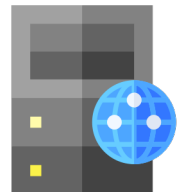
<representation>

PUT / HTTP/1.1
Host: www.example.com
If-Match: "39d5-5943f8fdc2607"

<new representation>

HTTP/1.1 200 OK
Content-Type: text/html
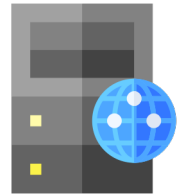ETag: "47cf-b922e4f191138"

GET / HTTP/1.1
Host: www.example.com

HTTP/1.1 200 OK
Content-Type: text/html
ETag: "39d5-5943f8fdc2607"

<representation>
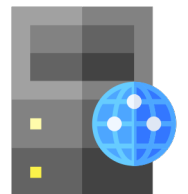
http://www.example.com/ is modified – new ETag is 4b4f-77a6c3ab117a2

PUT / HTTP/1.1
Host: www.example.com
If-Match: "39d5-5943f8fdc2607"

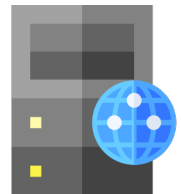*<new representation>*

HTTP/1.1 412 Precondition Failed
Content-Type: text/html
ETag: "4b4f-77a6c3ab117a2"

GET / HTTP/1.1
Host: www.example.com
If-None-Match: "4b4f-77a6c3ab117a2"

HTTP/1.1 304 Not Modified

Timestamps

Supplied by the server using the `Last-Modified:` header:

- `Last-Modified: Fri, 18 Sep 2020 17:25:23 GMT`

`If-Modified-Since:` *<dayname>*, *<day>* *<month>* *<year>* *<hour>*:*<min>*:*<sec>* GMT

- Only carry out the operation if the resource timestamp is after the given date
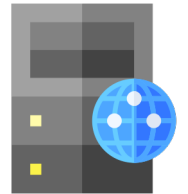- Return 304 `Not Modified` if before the given date

`If-Unmodified-Since:` *<dayname>*, *<day>* *<month>* *<year>* *<hour>*:*<min>*:*<sec>* GMT

- Only carry out the operation if the resource timestamp is not after the given date
- Return 412 `Precondition Failed` if after the given date

```
GET / HTTP/1.1
Host: www.example.com
```

```
HTTP/1.1 200 OK
Content-Type: text/html
Last-Modified: Mon, 14 Sep 2020 12:23:01 GMT

<representation>
```
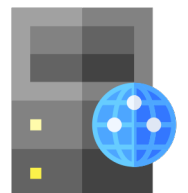
http://www.example.com/ is modified on Tue, 15 Sep 2020 14:34:07 GMT

```
PUT / HTTP/1.1
Host: www.example.com
If-Unmodified-Since: Mon, 14 Sep 2020 12:23:01 GMT

<new representation>
```
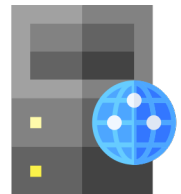
```
HTTP/1.1 412 Precondition Failed
Content-Type: text/html
Last-Modified: Tue, 15 Sep 2020 14:34:07 GMT
```

```
GET / HTTP/1.1
Host: www.example.com
If-Modified-Since: Tue, 15 Sep 2020 14:34:07 GMT
```

```
HTTP/1.1 304 Not Modified
```

Further reading

Fielding, R. and Reschke, J. (2014) *Hypertext Transfer Protocol (HTTP/1.1): Conditional Requests*. RFC7232.

    https://tools.ietf.org/html/rfc7232

Next Lecture: Cookies