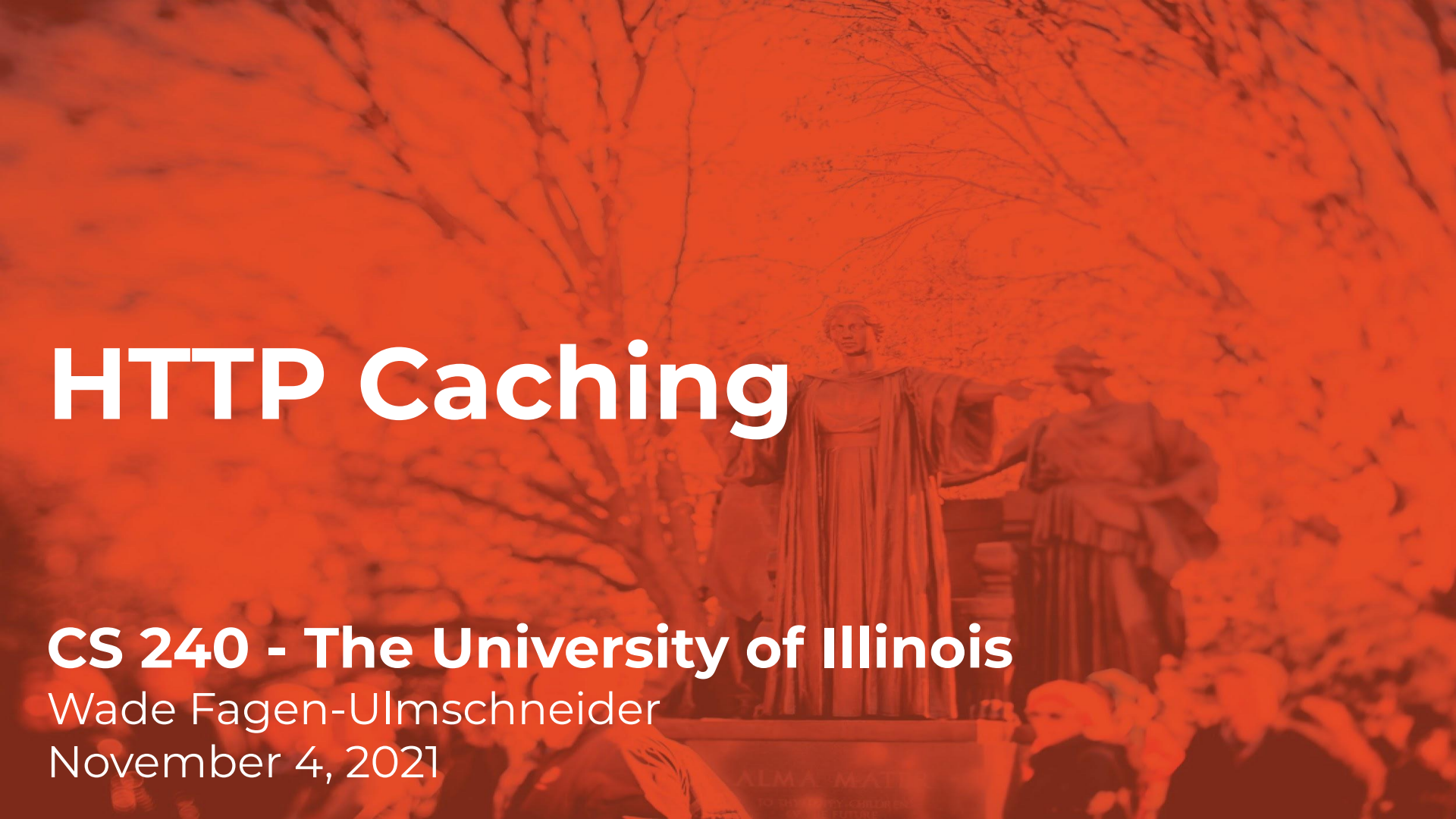


HTTP Caching

CS 240 - The University of Illinois

Wade Fagen-Ulmschneider

November 4, 2021

Directory Permission Bits

Following up from lecture on Tuesday, what impact does directory read and execute bits have? Here's my experiment:

- Create two directories: `test-no-r` and `test-no-x`.
- Create one file in each directory, `hello.txt`.

```
$ ls -la
```

```
1 d-wx--x--x 2 waf  waf  4096 Nov  3 11:20 test-no-r
2 drw-r--r-- 2 waf  waf  4096 Nov  3 11:20 test-no-x
```

```
$ ls test-no-r
```

```
ls: cannot open directory 'test-no-r': Permission denied
```

```
$ ls test-no-x
```

```
ls: cannot access 'test-no-x/hello.txt': Permission denied
hello.txt
```

```
$ cat test-no-r/hello.txt
```

```
Hello world!
```

```
$ cat test-no-x/hello.txt
```

```
cat: test-no-x/hello.txt: Permission denied
```

Directory Permission Bits

- **r** bit:

- **x** bit:

Caching

Caching is critical across all parts of computer systems. We have already seen two forms of caching already:

1.

2.

ETag

```
GET /lecture.jpg HTTP/1.1\r\n
[...]
```

```
GET /lecture.jpg HTTP/1.1\r\n
[...]
```

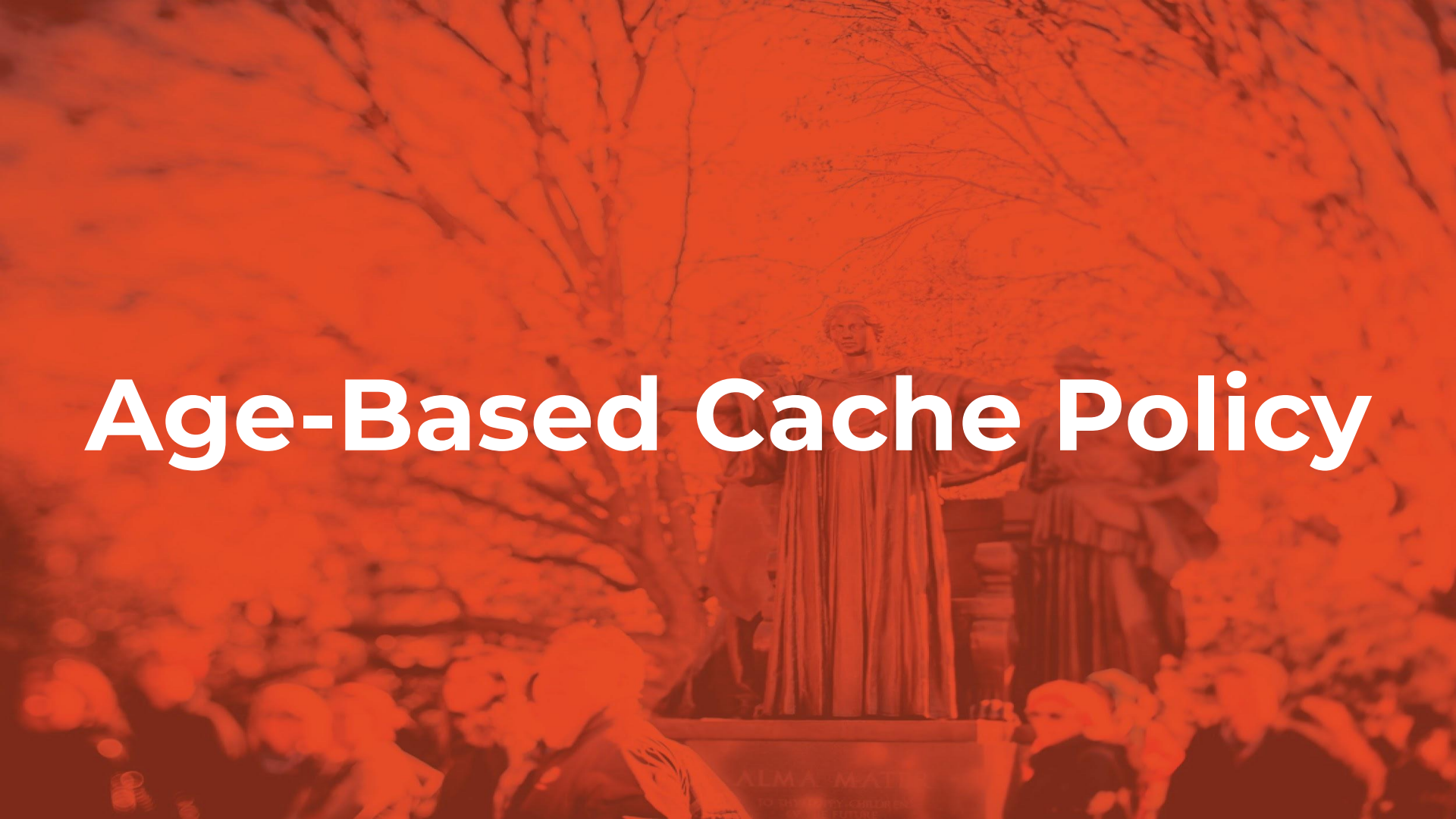
```
HTTP/1.1 200 OK\r\n
Date: Wed, 03 Nov 2021 16:31:20 GMT\r\n
Last-Modified: Tue, 01 Sep 2020 17:07:47 GMT\r\n
ETag: "8073356a8280d61:0"\r\n
Content-Length: 25725\r\n
[...]
```

```
GET /lecture.jpg HTTP/1.1\r\n
If-None-Match: "8073356a8280d61:0"\r\n
[...]
```

```
GET /lecture.jpg HTTP/1.1\r\n
If-None-Match: "8073356a8280d61:0"\r\n
[...]
```

```
HTTP/1.1 304 Not Modified\r\n
[...]
```

Q: If you visit a webpage 100 times a day, how many times would you need to check the ETag?



Age-Based Cache Policy

```
GET /lecture.jpg HTTP/1.1\r\n
[...]
```

```
HTTP/1.1 200 OK\r\n
Cache-Control: public, max-age=31919000\r\n
Age: 6745054\r\n
[...]
```

```
HTTP/1.1 200 OK\r\n
Cache-Control: public, max-age=31919000\r\n
Age: 6745054\r\n
[...]
```

Q: If you visit a webpage 100 times a day, how many times would you need to request the cached file?

ETag Caching	Age-Based Caching
Best Used For:	Best Used For:
Drawbacks:	Drawbacks:

Motivation for Caching

Usage Category	Cost
0 GiB - 1 GiB	$0.00 *First GiB is free!*
1 GiB - 10 TiB	$0.09 per GiB

Suppose you're running a website that sends 100,000 HTTP packets /day where your average packet headers of 0.1 KiB and the content is 200 KiB.

1. How much bandwidth would be used in a 31-day month?

2. How much would that bandwidth cost on AWS?

3. You implement ETag caching and you find that your server has a cache-hit rate of 50%. How much bandwidth and money would you save?

4. You implement age-based caching and you find that your server has a cache-hit rate of 50%. How much bandwidth and money would you save?