Web-based Development WS17/18

Lively4 Offline

Hasso Plattner Institute Potsdam
Software Architecture Group

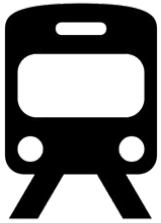
Sebastian Koall, David Rauch
30.01.2018

Outline

- Project Idea
- Demo
- Architecture and Implementation
- Related Work
- Conclusion
- Future Work

Project Scenario

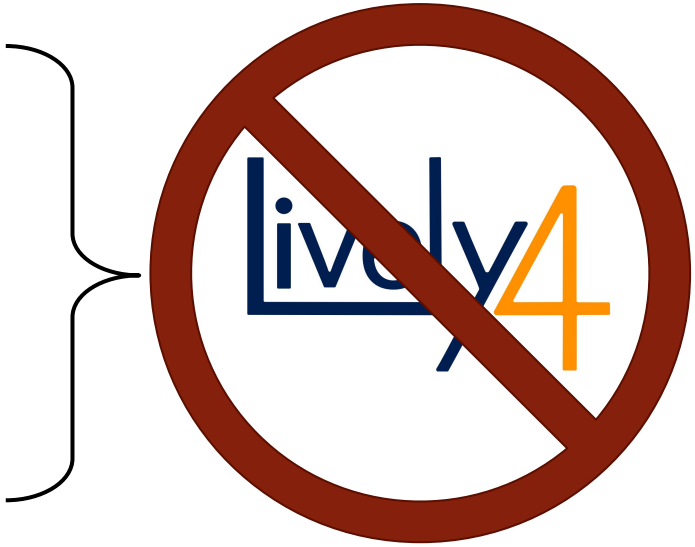
Imagine you are…



on a train,

with spotty Internet,

or no connection at all.

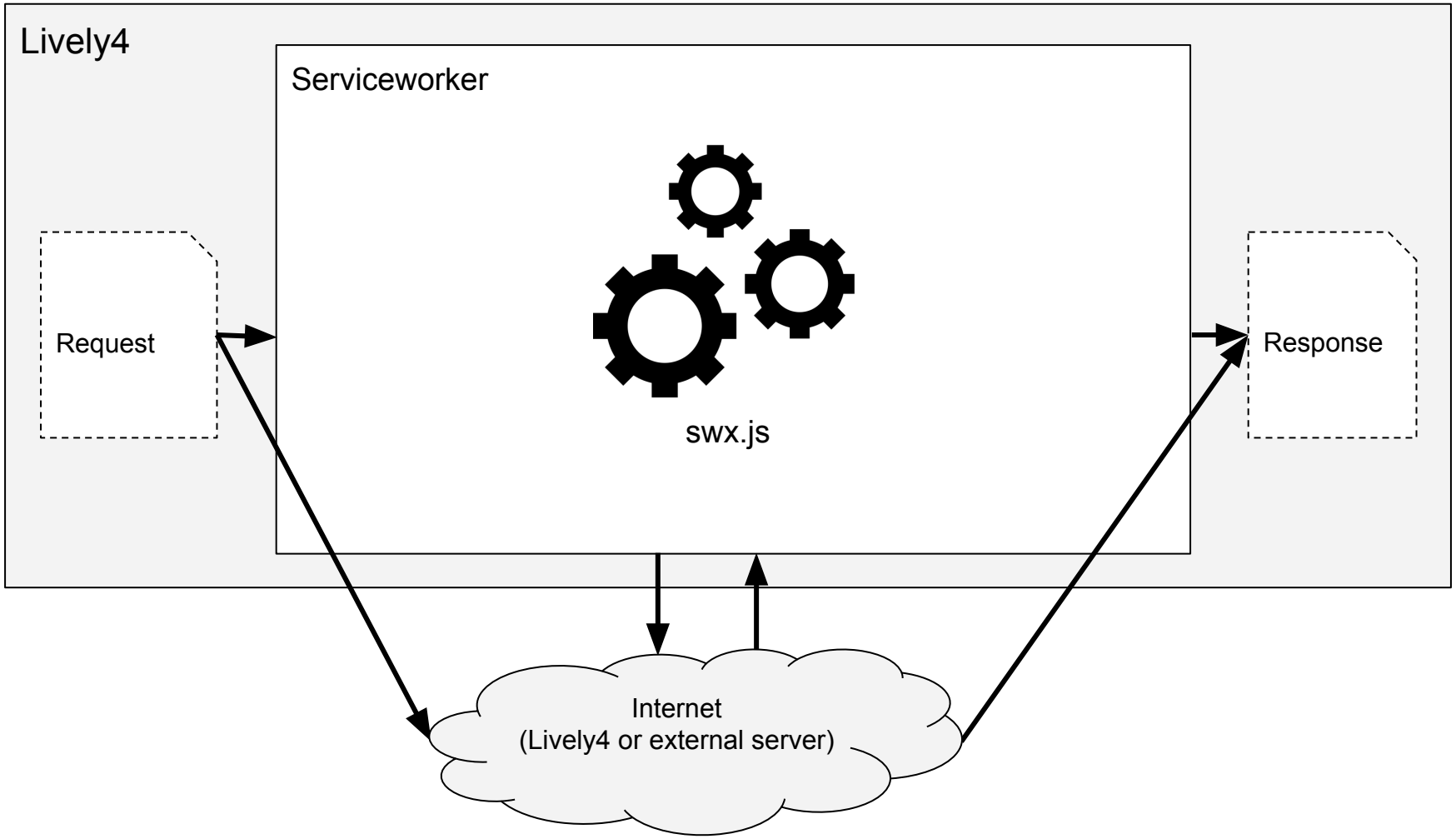


Project Concept

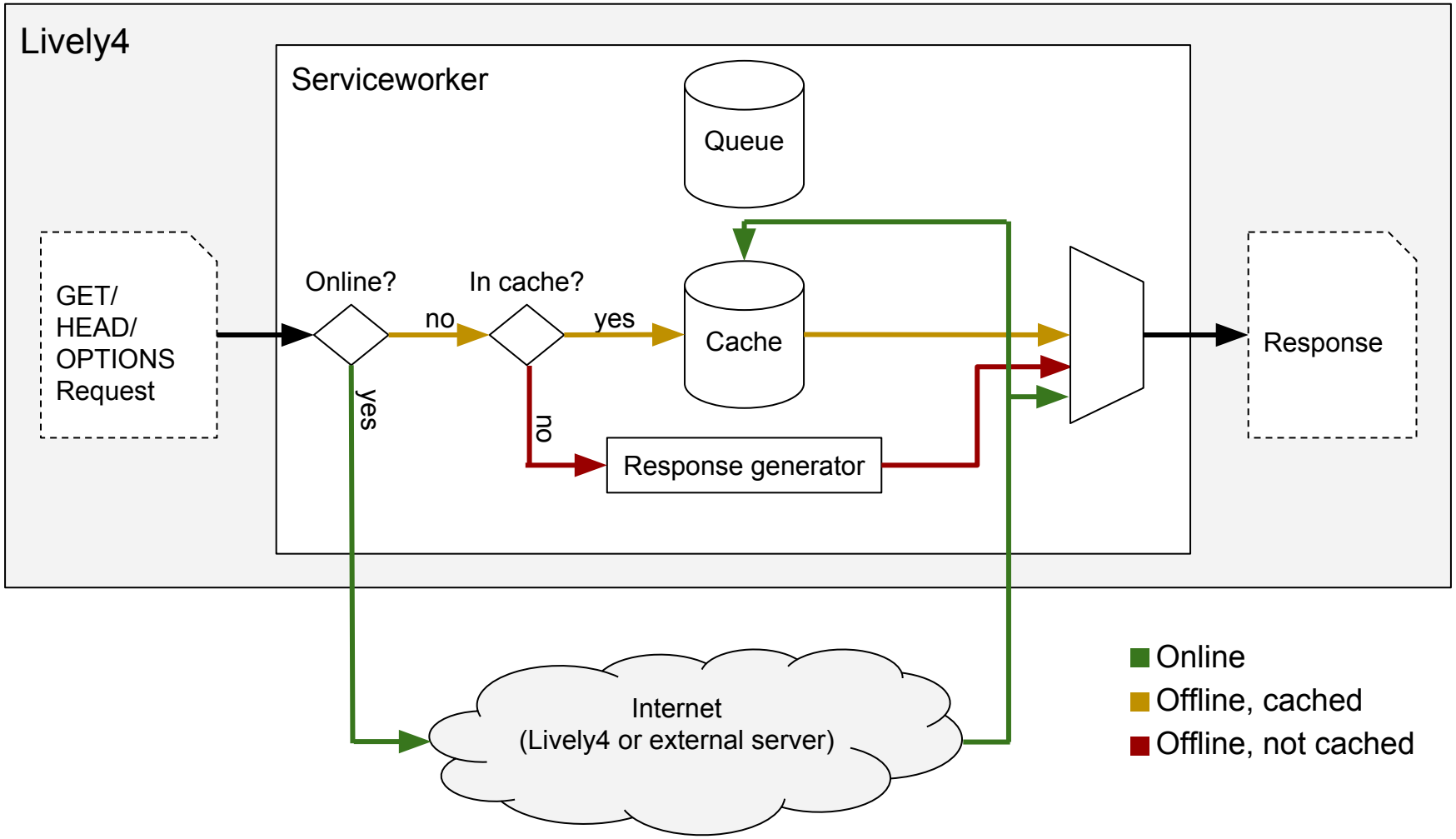
- Make Lively4 available offline
  - Short connection errors do not cause problems
  - Entire system loadable without connection
- View documents while offline
  - Show last known version
- Edit documents while offline
  - Synchronize changes when back online

Demo

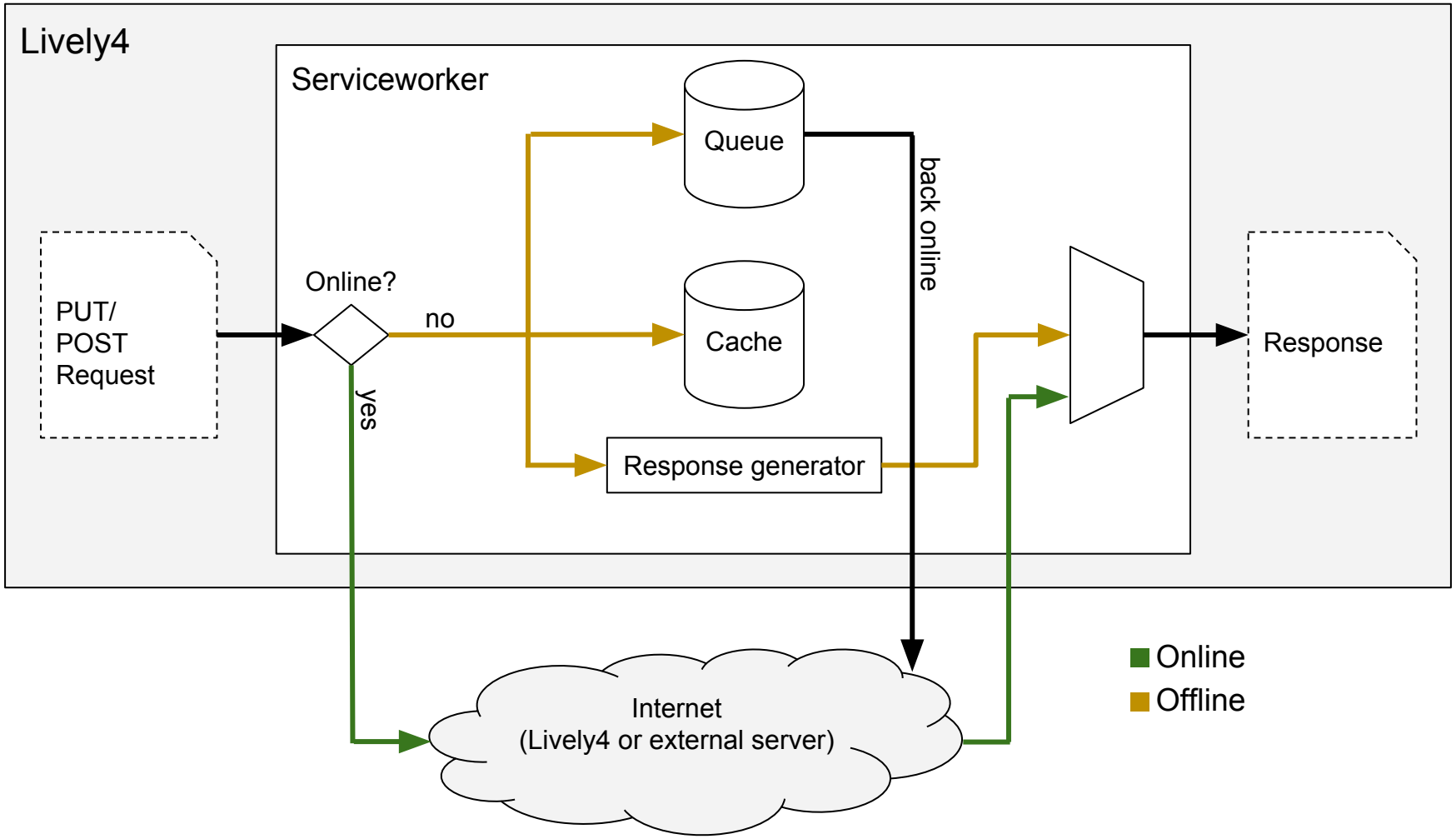
Architecture (1)



Architecture (2)



Architecture (3)



Data Storage

- Use IndexedDB instead of built-in `caches` library
- Limitations:
  - Only one concurrent read-write connection per DB
  - Slow responses (up to ~200ms)

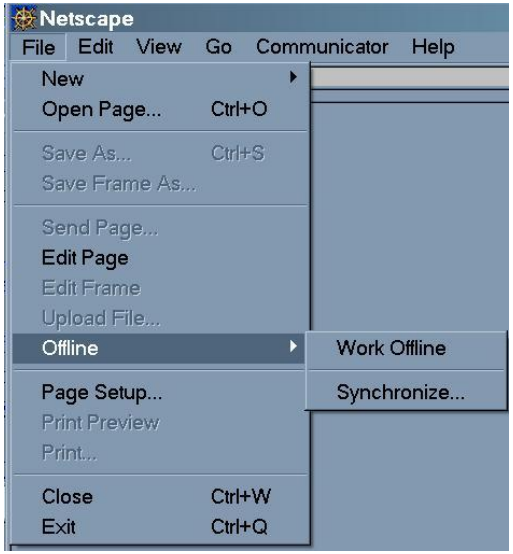
#	Key	Value
0	"GET https://lively-kernel.org//lively4/lively4-of...	▼ Object timestamp: 1516627918277 ▼ value: ▶ body: Blob(215) {size: 215, type: "text/html"} ▼ headers: access-control-allow-headers: "*" access-control-allow-methods: "OPTIONS, GET, DELETE, PUT" access-control-allow-origin: "*" access-control-request-method: "*" connection: "Keep-Alive" content-type: "text/html" date: "Mon, 22 Jan 2018 13:26:19 GMT" fileversion: "52393fe99f2ada7f76109c6ee9ced1d530ebb18b" keep-alive: "timeout=15, max=99" transfer-encoding: "chunked" status: 200 statusText: "OK" type: "response"
1	"GET https://lively-kernel.org/lively4/lively4-off...	▼ Object timestamp: 1516627925475 ▶ value: {type: "response", status: 200, statusText: "OK", headers: {…}
2	"GET https://lively-kernel.org/lively4/lively4-off...	▶ Object

Are we online again?

- No sufficient built-in JS feature
  - `navigator.onLine` tests for available network
  - “Network” does not imply “Internet”
  - Definition also depends on browser
- Solution: Test for Lively4 Server connection
  - Polling necessary
- Notify user about connection state

Related Work

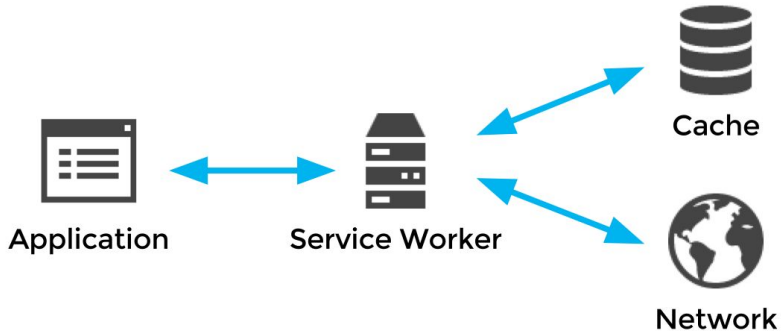
- Offline Mode



- AppCache Manifest

```
CACHE MANIFEST
index.html
stylesheet.css
images/logo.png
scripts/main.js
```

- ServiceWorker
  - Request deferrer [2]
  - MDN serviceworker demo [5]
  - Serviceworker Precache [6]



Conclusion

- Lively4 architecture was easily extendable
- Built-in `caches` library not sufficient
  - Only supports GET requests
- IndexedDB not sufficient
  - Limited connection management
  - Slower than expected
- No clear definition of “being online”

Future Work

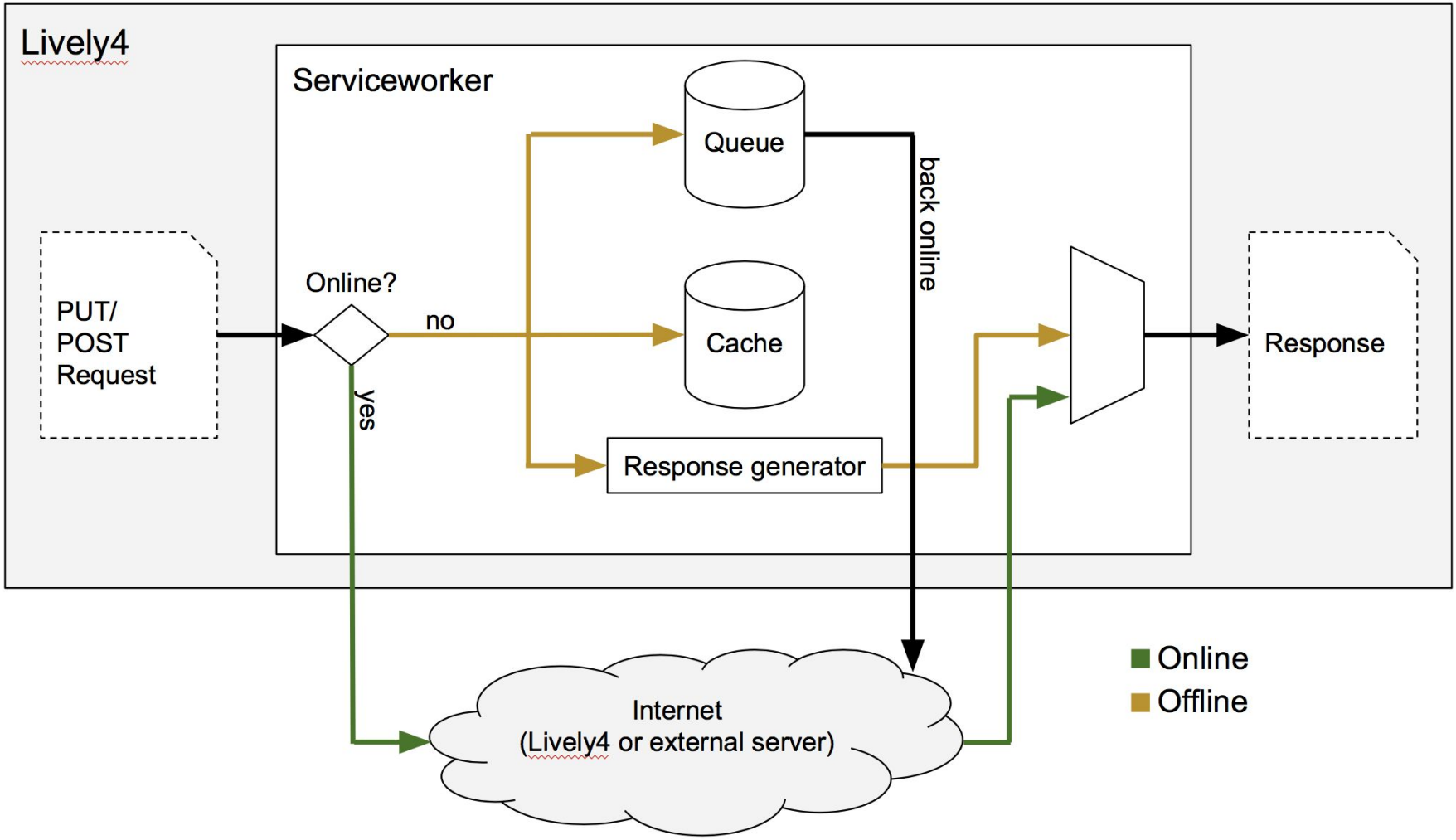
- File dependent caching strategies
  - Always load files > 5 MB from cache
  - Mount specific behavior
- Improve conflict solving
  - Currently uses default behavior of the server
  - Possibly unwanted results
- IndexedDB alternatives

References

1. IndexedDB documentation:
   https://developer.mozilla.org/en/docs/IndexedDB
2. Serviceworker request deferrer:
   https://serviceworke.rs/request-deferrer_demo.html
3. Serviceworker API documentation:
   https://developer.mozilla.org/en/docs/Web/API/Service_Worker_API
4. `navigator.onLine` documentation:
   https://developer.mozilla.org/en-US/docs/Web/API/NavigatorOnLine/onLine
5. MDN Serviceworker demo:
   https://mdn.github.io/sw-test/
6. Chrome Labs Serviceworker precache:
   https://github.com/GoogleChromeLabs/sw-precache

Now Offline!

Representative Picture

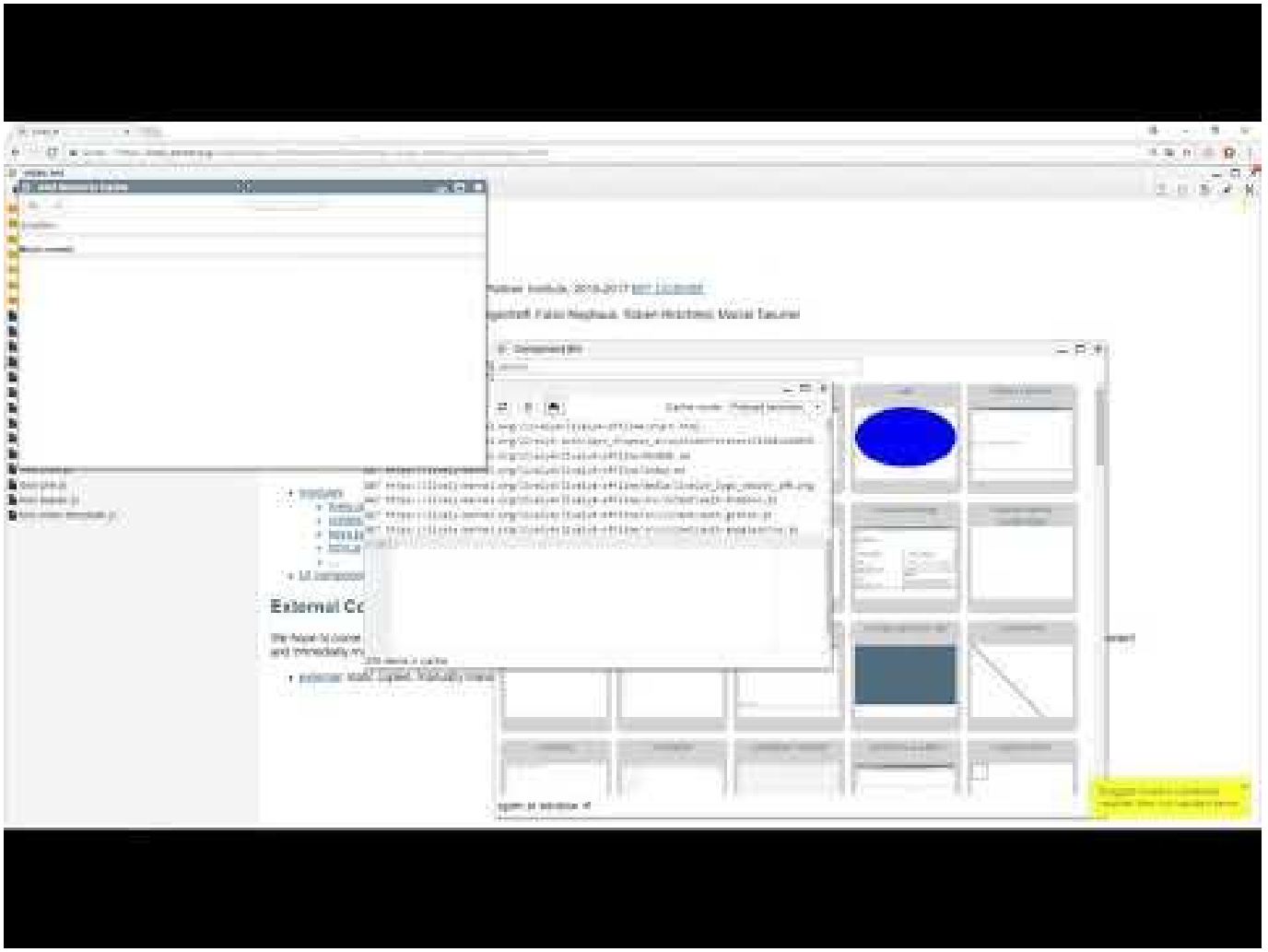


Abstract

Lively4 Offline delivers almost all functionality of Lively4, even when no internet connection is available. Four different caching modes are supported: Caching can be deactivated completely; Only essential files are cached; Favorites are tracked and automatically cached; Or Lively4 is fully cached. Cached files can be edited even if the network connection is interrupted – the corresponding network requests are queued, combined, and processed once the user is back online.

Additionally, content from connected cloud providers can be cached for offline usage. To prevent caching of large amounts of data, it is possible to selectively cache only certain files or subdirectories.

Screencast



Icons

- wifi by Nikita Kozin from the Noun Project
- offline by Nikita Kozin from the Noun Project
- Gear by Chameleon Design from the Noun Project