

Progressive Web Apps as Digital Library Software Architectures for Emulation and Preservation

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Montana State University
Open Repositories 2019

“Why can’t I get this Digital Library App to .WARC?”

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Montana State University
Open Repositories 2019

Research Motivation

“The Web is dead. Long live the Internet.”

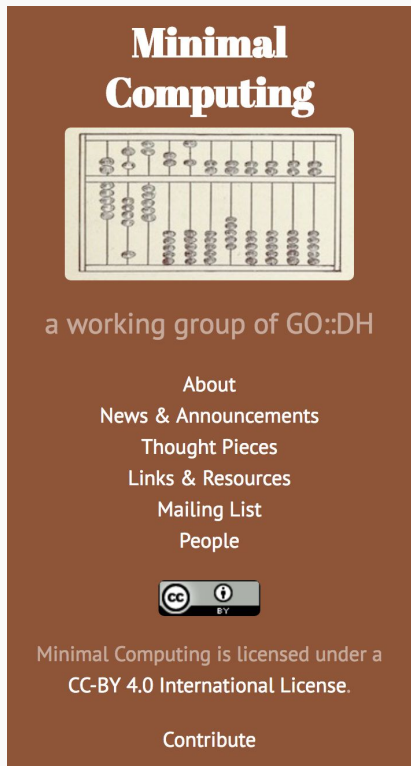
Chris Anderson (2010)

<https://www.wired.com/2010/08/ff-webrip/>

“These apps aren’t packaged and deployed through stores,
they’re just **websites that took all the right vitamins.**”

Alex Russell @slightlylate

<https://infrequently.org/2015/06/progressive-apps-escaping-tabs-without-losing-our-soul/>



[Home](#)

Minimal Computing in Libraries: Introduction

by Stewart Varner - 15 Jan 2017

[The following paper was delivered at the DLF 2016 Forum in Milwaukee as the introduction to the “Minimal Computing in Libraries: Case Studies and the Case” panel]

Content management systems like Wordpress, Drupal, Omeka and even OJS have had a huge impact in digital scholarship. Before those tools emerged, building a website was actually kind of tough. Even if you managed to get access to a webserver, you had to have a little tech know-how to get something online ... and to make it look good was a special challenge.

The rise of the CMS changed most of that and the advent of hosted versions of CMSs changed all of that. No server, no problem. No HTML/CSS skills, no problem. And across the world wide web, millions

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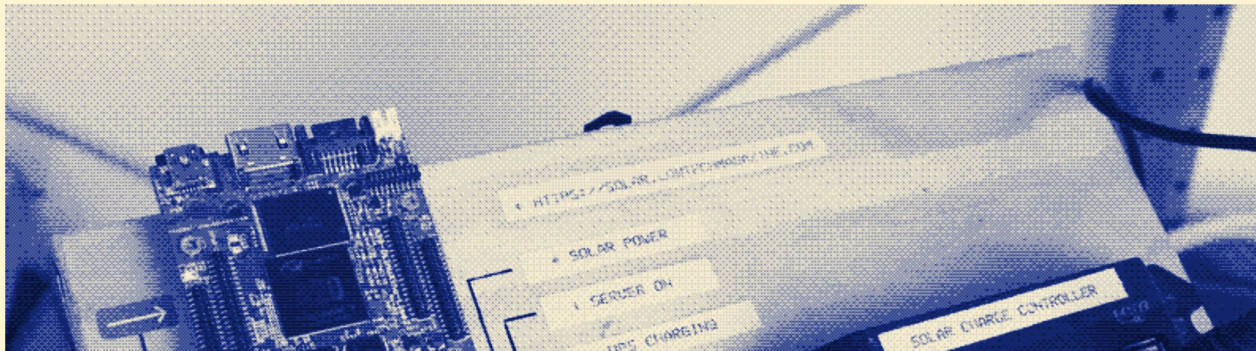
This is a solar-powered website, which means it sometimes goes offline ☀

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Low-tech Solutions

How to Build a Low-tech Website?

Our new blog is designed to radically reduce the energy use associated with accessing our content.



WTH is a Progressive Web App?

Progressive Web Apps (PWA)

Progressive Web Apps (PWA)

Manifest file

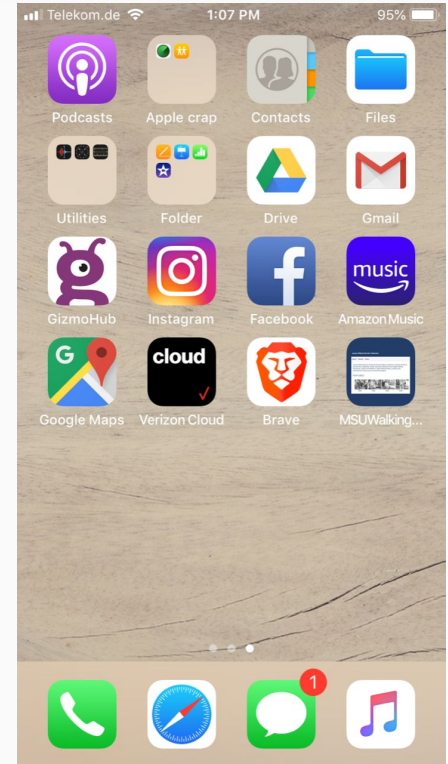
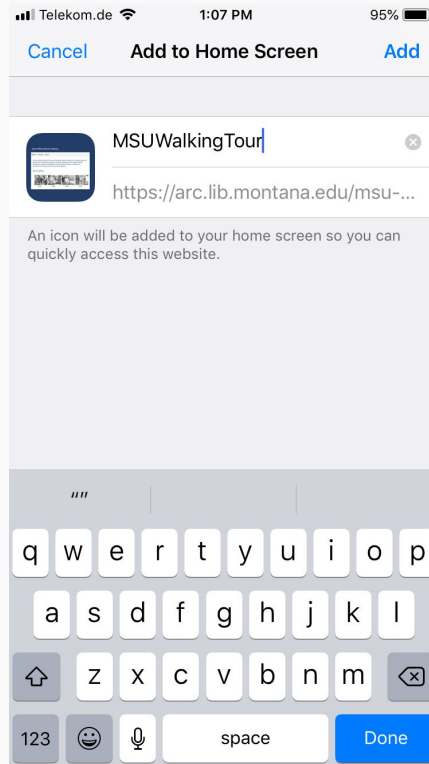
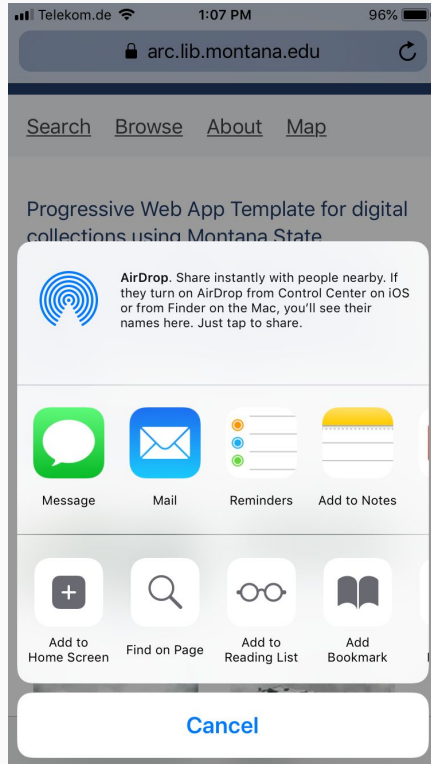
Progressive Web Apps (PWA)

Manifest File Service Worker

Progressive Web Apps (PWA)

Manifest File
Service Worker
Offline + Installable

Installability



What is a PWA?

A software
development
practice

over HTTPS

manifest.json (installable)

Javascript to cache files for offline

Static data stores (json)

Manifest (.json)

```
1  {
2    "name": "James Willard Schultz Collection",
3    "short_name": "SchultzPWA",
4    "start_url": ".",
5    "display": "standalone",
6    "background_color": "#213c69",
7    "description": "A digital library template app",
8    "theme_color": "#213c69",
9    "categories": ["books", "education"],|
10   "icons": [
11     {
12       "src": "./img/icons/icon-72x72.png",
13       "sizes": "72x72",
14       "type": "image/png"
15     },
16     {
17       "src": "./img/icons/icon-96x96.png",
18       "sizes": "96x96",
19       "type": "image/png"
20     },
21     {
22       "src": "./img/icons/icon-128x128.png",
23       "sizes": "128x128",
```

Service Worker (.js)

```
1 // Hola! This is an over-simplified ServiceWorker for a digital library PWA
2
3 const cacheName = 'diglib-pwa-v1';
4 const staticAssets = [
5   './',
6   './index.html',
7   './app.js',
8   './styles.css',
9   'items.json',
10  'manifest.json'
11 ];
12
13 self.addEventListener('install', async event => {
14   const cache = await caches.open(cacheName);
15   await cache.addAll(staticAssets);
16 });
17
18 self.addEventListener('activate', event => {
19   event.waitUntil(self.clients.claim());
20 });
21
22 self.addEventListener('fetch', event => {
23   const req = event.request;
```

items (.json)

```
1  [{
2    "item": {
3      "recordInfo_recordIdentifier": "42",
4      "identifier_ark": "ark:\V75788\m45d4f",
5      "identifier": "https://arc.lib.montana.edu/schultz-0010/objects/thumb-041.jpg",
6      "titleInfo_title": "James Willard Schultz and Friends: in a Garden, 1939",
7      "abstract": "2 older women and 1 older man sitting in garden in front of house. Not",
8      "extension": "aged persons, friendship",
9      "name_namePart": "James Willard Schultz",
10     "originalMetadata_name": "Unknown",
11     "originInfo_dateIssued": "1939",
12     "originalMetadata_dateIssued": "1939",
13     "originInfo_dateCreated": "2005-09-09",
14     "location_physicalLocation": "Montana State University Library Collection 10 - James",
15     "typeOfResource": "1 Photographic Print, B&W, 7 x 5.5 cm ",
16     "originInfo_publisher": "Montana State University--Bozeman",
17     "accessCondition": "https:\V\creativecommons.org\licenses\by-nc-sa\3.0\us\\"",
18     "subject_topic1": "Montana--History",
19     "subject_topic2": "Indians of North America--Montana",
20     "subject_topic3": "Schultz, James Willard, 1859-1947",
21     "subject_topic4": "James Willard Schultz",
22     "note": "None",
23     "genre": "Still Image",
24     "physicalDescription_internetMediaType": "image\jpeg",
25     "physicalDescription_digitalOrigin": "reformatted digital",
26     "recordInfo_languageOfCataloging": "en",
27     "recordInfo_recordContentSource": "MZP",
28     "recordInfo_recordCreationDate": "2005-09-09 00:00:00",
```

Benefits

Discoverable

Linkable

Installable

Write once, Publish Everywhere

PWAs at Scale?

 [Blog](#) [Events](#) [Product](#) [Insights](#) [Company](#)

English (Australia)  [Sign Up](#) 



Patrick Traughber
[@ptroughber](#)

Product Manager, Twitter

Only on Twitter

[@twittereng](#)
[#Twitterlite](#)

Product

Introducing Twitter Lite

By [Patrick Traughber](#)
Friday, 7 April 2017    

Every day, millions of people around the world use Twitter to see what's happening right now. However, there are several barriers to using Twitter, including slow mobile networks, expensive data plans, or lack of storage on mobile devices. While smartphone adoption grew to 3.8 billion connections by the end of 2016, 45% of mobile connections are still on slower 2G networks, [according to GSMA](#).

Library Examples?

Library Examples

[Catalog Advanced >](#) [Article Advanced >](#) [Site Search >](#)

[SEARCH](#)

[About](#) [Research](#) [Collections](#) [Services](#) [Hours](#) [Ask a Librarian](#) [Account](#) [CHAT](#)

Emancipation in History and Memory

View three documents that illuminate the legacies of the antislavery movement and of wartime abolition in American history. On view in Harrison/Small through Monday, October 22.

[FIND OUT MORE](#)

Today's Hours

Alderman	8am - 9pm
Brown	Close at 9pm
Clemons	Close at Midnight
Fine Arts	9am - 6pm
Harrison Institute	9am - 5pm
Mathematics	1pm - 5pm
Music	9am - 6pm
Physics	9am - 5pm
Robertson Media Center	8am - 12am
Scholars' Lab	8am - 9pm
Special Collections	9am - 5pm

[VIEW ALL HOURS →](#)

Library Examples



Sample Application

James Willard Schultz PWA

James Willard Schultz Collection

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James Willard Schultz Photos & Personal Papers Collection includes photos & documents of Blackfeet, Blood, Kootenai, Shoshone and Arapaho Native Americans, Glacier and Waterton Lakes National Parks, as well as his professional writing career and personal papers.

FEATURED



1939



1939



1939



1939



1939



1939



1939



1932

[Search](#) [Browse](#) [About](#)

BROWSE

a timeline view of the collection

1939 James Willard Schultz and Friends: in a Garden, 1939

2 older women and 1 older man sitting in garden in front of house. Nothing written on verso.

1939 Bernadotte: Blackfeet Indians: White Man and Woman Dressed in Indian Garb Pose with Three Indians, 1939

White man and woman dressed in Indian garb posing with 3 Indians in full dress outside in meadow. Nothing written on verso.

1939 Bernadotte: Blackfeet Indians: Man in Full Indian Dress in Front of Tipi, 1939



No internet

Try:

- Checking the network cables, modem, and router
- Reconnecting to Wi-Fi

ERR_INTERNET_DISCONNECTED

James Willard Schultz Collection

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James Willard Schultz Photos & Personal Papers Collection includes photos & documents of Blackfeet, Blood, Kootenai, Shoshone and Arapaho Native Americans, Glacier and Waterton Lakes National Parks, as well as his professional writing career and personal papers.

FEATURED



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Software Architectures

index.html

manifest.json

styles.css

app.js

serviceworker.js

items.json (static “database”)

Implications for Digital Library Practice

Design that is “Mobile First”
but, desktop-compliant.

Simple
Software
Architectures

HTML

CSS

Javascript

JSON

HTTPS first

Open Data practices

JSON is a fact.

Web-scale Cataloging

Manifest files = Metadata Record

Emulation in the most
widely-deployed software
application ever.

Enabling the Web Archive

Static Pages, Metadata

Next Steps

- Pilots
 - MSU Historical Photos + Walking Tour
 - Tibetan Film Archive
- Creating archive (.warc) into build process
- Experimenting with performance & search engine optimization (SEO)
- Revisiting the datastore - JSON-LD

Research Implications

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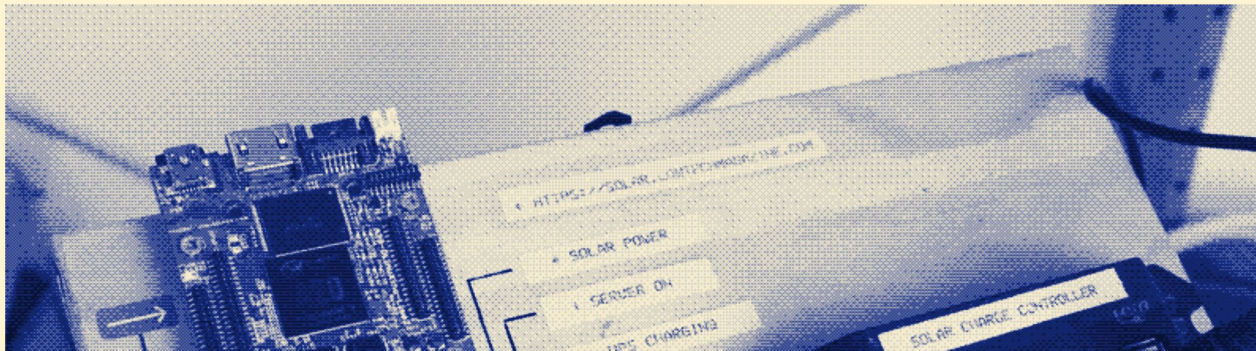
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Digital libraries for Archiving.

- emulatable and preservable (static HTML)
- set up for indexing and metadata (manifest file)
- static “databases” that can be reused/redeployed

Digital libraries for Everyone.

- lightweight computing practices
- “Green” digital libraries that consume less energy
- accessible to any user on limited device

****Thank you****

Jason A. Clark
@jaclark

- PWA Builder
 - www.pwabuilder.com
- PWA Universal Builder
 - github.com/lukeed/pwa
- Migrate your Site to to Progressive Web App
 - [\[codelab\]](https://codelab)
- Web Manifest Generator
 - app-manifest.firebaseapp.com
- PWA Image Generator
 - www.pwabuilder.com/imageGenerator

References and Follow-up Resources

Progressive Web Apps - Mozilla Developer Network

<https://developer.mozilla.org/en-US/docs/Web/Apps/Progressive>

"Nearly one in three rural households lacks broadband internet."

Map to Prosperity - Center for Rural Affairs

Johnathan Hladik

October 12, 2018

<https://www.cfra.org/publications/MapToProsperity>

Ignored By Big Telecom, Detroit's Marginalized Communities Are Building Their Own Internet

Kaleigh Rogers

November 16, 2017

https://motherboard.vice.com/en_us/article/kz3xyz/detroit-mesh-network

Progressive Web Apps: Escaping Tabs Without Losing Our Soul

Alex Russell

June 15, 2015

<https://infrequently.org/2015/06/progressive-apps-escaping-tabs-without-losing-our-soul/>

Minimal Computing in Libraries: Introduction

Stewart Varner

January 15, 2017

<http://go-dh.github.io/mincomp/thoughts/2017/01/15/mincomp-libraries-intro/>