



Evidentiary Use of the Temporal Web

Presented by: Nicholas Taylor and Joe Dugan

Specht v. Google, Inc. (2010)

The screenshot shows the Wayback Machine interface with the URL <http://www.androiddata.com:80/>. The page title is "Android Data - Content Manager". It features a logo of a person holding a tablet, the text "android data® Bringing business into the age of e-commerce.", and a navigation menu with links to HOME, CONTACT, SUPPORT, and TESTIMONIALS. Below the menu, there's a diagram illustrating the system architecture with three main components: "Content Manager", "Caching Server", and "Administrator's Toolkit", each represented by a computer monitor icon. A central server tower icon connects them. A sidebar on the left shows a timeline from 2004 to 2007 with a yellow bar indicating the captured date.

Android Data® is a suite of software that enables the remote administration of ecommerce content.

The system is comprised of three modules: the [Caching Server](#), the [Content Manager](#), and the [Administrator's Toolkit](#).

Copyright © 2002 Android Data Corporation. All Rights Reserved.

[Internet Archive: "android data"](#)

[Specht v. Google, Inc., 758 F. Supp. 2d 570 \(N.D. Ill. Dec. 17, 2010\)](#)

The screenshot shows the Wayback Machine interface with the URL http://www.openhandsetalliance.com/android_overview.html. The page title is "open handset alliance". It features a large "ANDROID" logo and a sub-headline "Introducing Android". The main content discusses the release of the Android Software Development Kit (SDK) on November 12, 2007, and highlights the platform's open nature, modular architecture, and developer tools. It also mentions the "Fast & easy application development" feature, which allows developers to build rich peer-to-peer social applications.

open handset alliance

Home | Alliance | [Android](#) | Developers | Press | Contact

Overview | FAQ

ANDROID

Introducing Android

Android™ will deliver a complete set of software for mobile devices: an operating system, middleware and key mobile applications. On November 12, we will release an early look at the Android Software Development Kit (SDK) to allow developers to build rich mobile applications.

Open

Android was built from the ground-up to enable developers to create compelling mobile applications that take full advantage of all a handset has to offer. It is built to be truly open. For example, an application could call upon any of the phone's core functionality such as making calls, sending text messages, or using the camera, allowing developers to create richer and more cohesive experiences for users. Android is built on the open Linux Kernel. Furthermore, it utilizes a custom virtual machine that has been designed to optimize memory and hardware resources in a mobile environment. Android will be open source; it can be liberally extended to incorporate new cutting edge technologies as they emerge. The platform will continue to evolve as the developer community works together to build innovative mobile applications.

All applications are created equal

Android does not differentiate between the phone's core applications and third-party applications. They can all be built to have equal access to a phone's capabilities providing users with a broad spectrum of applications and services. With devices built on the Android Platform, users will be able to fully tailor the phone to their interests. They can swap out the phone's homescreen, the style of the dialer, or any of the applications. They can even instruct their phones to use their favorite photo viewing application to handle the viewing of all photos.

Breaking down application boundaries

Android breaks down the barriers to building new and innovative applications. For example, a developer can combine information from the web with data on an individual's mobile phone – such as the user's contacts, calendar, or geographic location – to provide a more relevant user experience. With Android, a developer could build an application that enables users to view the location of their friends and be alerted when they are in the vicinity giving them a chance to connect.

Fast & easy application development

Android provides access to a wide range of useful libraries and tools that can be used to build rich applications. For example, Android enables developers to obtain the location of the device, and allow devices to communicate with one another enabling rich peer-to-peer social applications. In addition, Android includes a full set of tools that have been built from the ground up alongside the platform providing developers with high productivity and deep insight into their applications.

[Internet Archive: "Open Handset Alliance"](#)



the web exists in space...

"[Tiles](#)" by [Ole Husby](#) under [CC BY-SA 2.0](#)



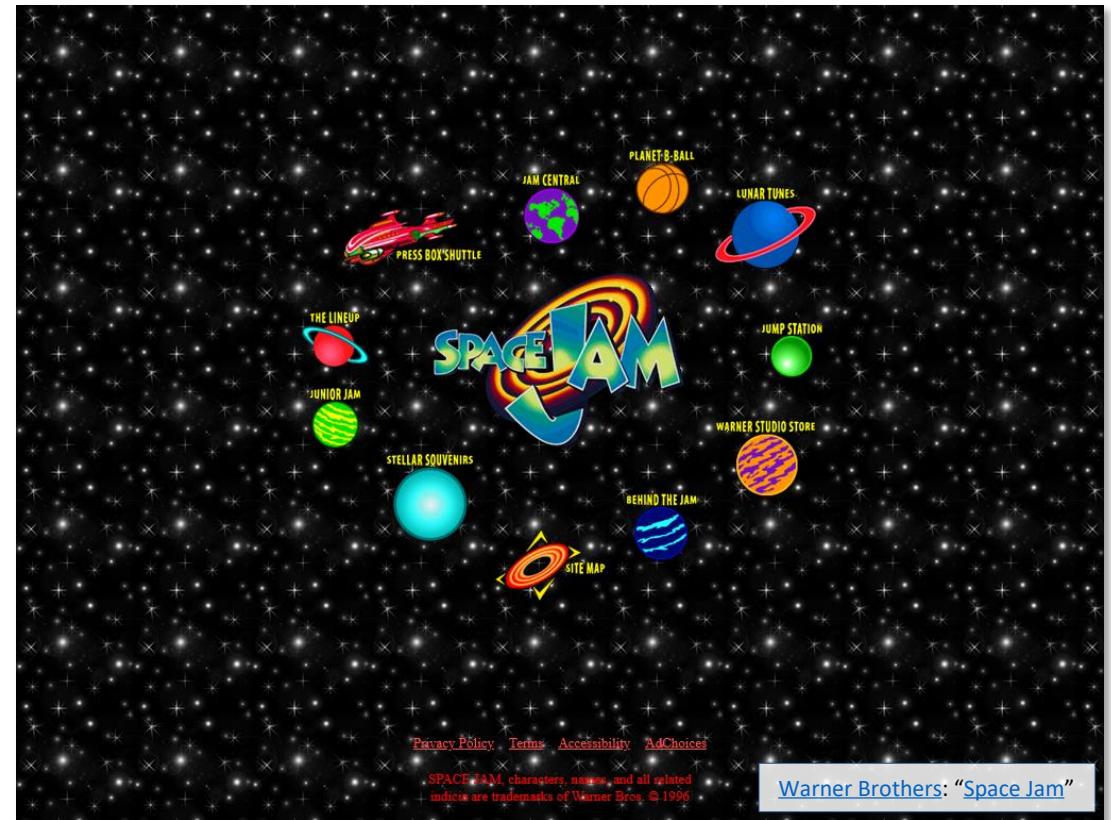
...it also exists in time

"Irregular paving" by Stephen Edmonds under CC BY-SA 2.0

two contemporary(?) websites



The screenshot shows the homepage of The New York Times. At the top, there's a navigation bar with links for U.S., INTERNATIONAL, CANADA, ESPAÑOL, and 中文. Below that is a search bar and a "LOG IN" button. The main headline is "A Charity Tied to the Supreme Court Offers Donors Access to the Justices". Below it is a photo of the Supreme Court chamber. Another headline is "These Musicians Made an Album. Now It's Nominated for a Grammy.", accompanied by a photo of an orchestra. On the left side, there's a tribute to Barbara Walters with a photo of her and text about her career. At the bottom, there's a headline about Donald Trump's tax returns.



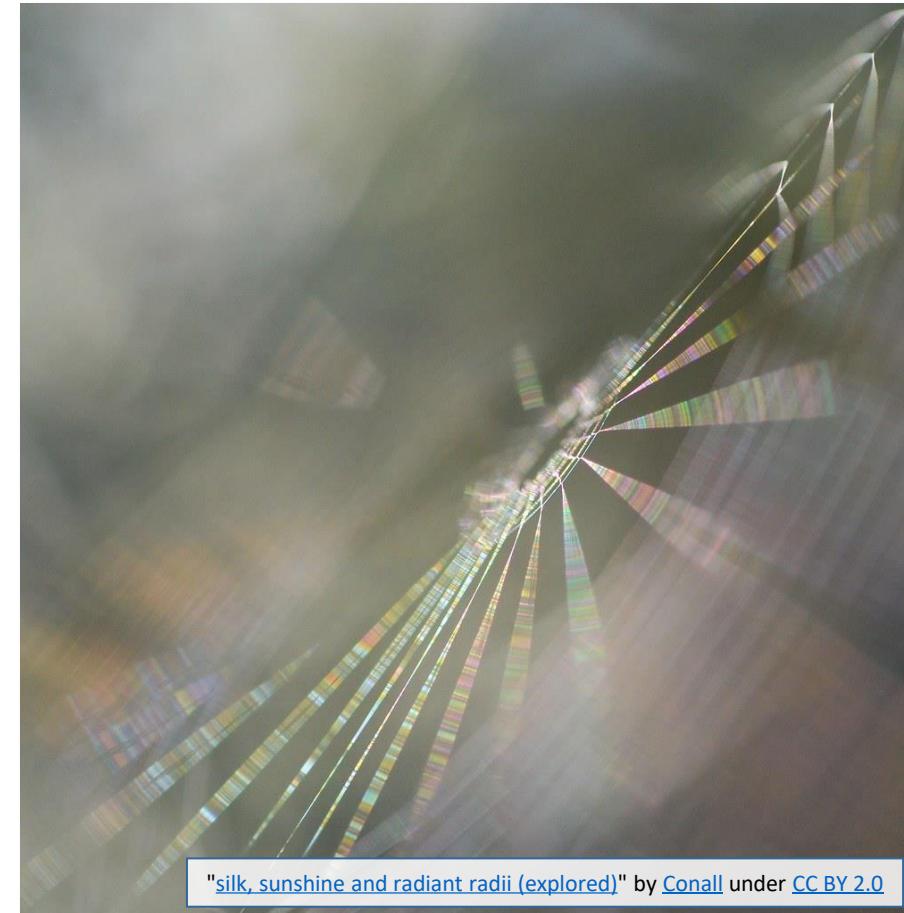
The screenshot shows the homepage of the Space Jam website, set against a background of a starry night sky. The main feature is the "SPACE JAM" logo, which is colorful and stylized. Around the logo are various links and icons, each associated with a planet or celestial body. These include "PRESS BOX'SHUTTLE", "JAM CENTRAL", "PLANET-B-BALL", "LUNAR TUNES", "THE LINEUP", "JUNIOR JAM", "STELLAR SOUVENIRS", "WARNER STUDIO STORE", "BEHIND THE JAM", and "SITE MAP". At the bottom right, there's a link to "Warner Brothers: 'Space Jam'".

why do the temporal attributes of web content matter?

- cases may turn on when specific information was publicly available and/or discoverable on the web
 - when first published
 - when updated
 - when absent
- examples:
 - patent disclosures
 - use of marks or copyrighted materials
 - terms of service
 - advertised claims regarding products or services
 - business relationships

why not just rely on client's own records?

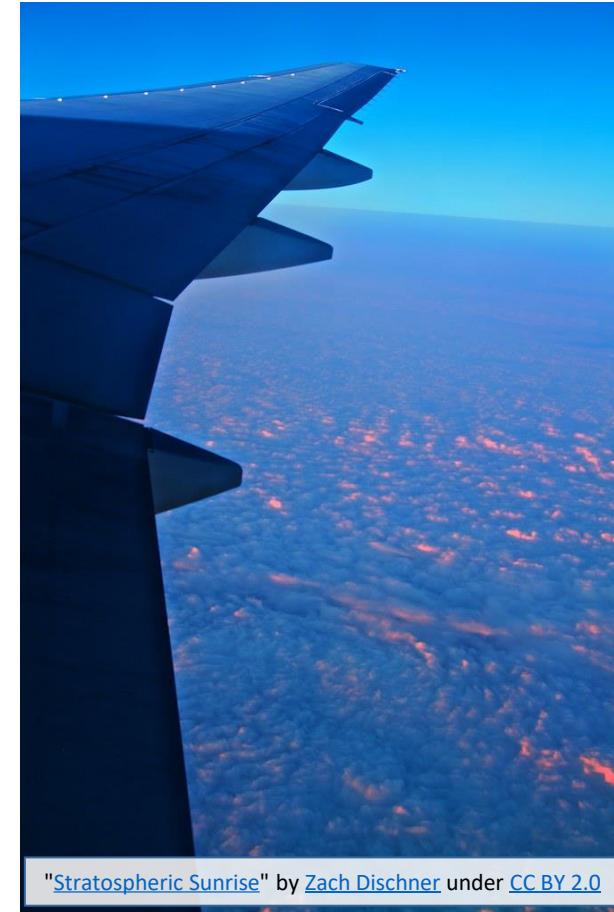
- unsystematic and/or incomplete recordkeeping
- savvy opposing counsel may check open sources for counter-indicative evidence
- material info disseminated via third party platforms
- some questions (e.g., discoverability) can't be definitively settled w/ client records alone



"silk, sunshine and radiant radii (explored)" by [Conall](#) under [CC BY 2.0](#)

overview

- Internet Archive Wayback Machine (IAWM)
 - background
 - interface + features
 - authentication
 - temporal coherence
- web timestamping
 - via IAWM
 - via Google
 - via Twitter



"Stratospheric Sunrise" by [Zach Dischner](#) under CC BY 2.0

Nicholas' background

- expert witness w/ IAWM focus
- M.L.S., UMD / M.A., Comm., Culture, & Tech., Georgetown
- Google, Sun, SCOTUS, Library of Congress, Stanford, LANL
- 16+ years in research libraries + tech firms
- 9+ years in web archiving
- presentations, peer review, grants, media contributor
- website: nullhandle.org



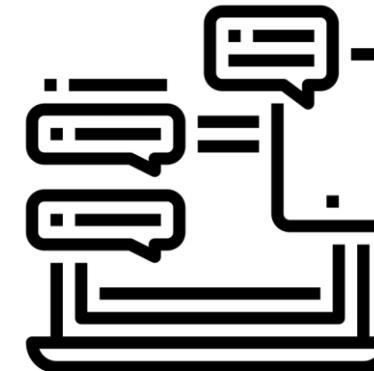
Joe's background

- J.D., 2015, Indiana University Maurer School of Law
- commercial litigation attorney at Gallagher Evelius & Jones in Baltimore
- previously worked as a trial attorney for DOJ, Civil Division
- clerked on U.S. District Court and U.S. Court of Appeals
- serves as his firm's unofficial go-to lawyer for ediscovery problem solving
- very recent experience navigating Slack ESI collection in the context of a discovery dispute



"Document Retention, Litigation Holds, and Ediscovery Best Practices with Emerging Communication Technologies"

- our 2nd session, Friday at 3:15p
- ediscovery ramifications of emerging communication tech – e.g., Zoom, Microsoft Teams, Google Drive, etc.
- topics: risk mitigation, client counseling strategies, benefits + drawbacks of DIY collection, primer on data exporting
- check out slides + CLE materials



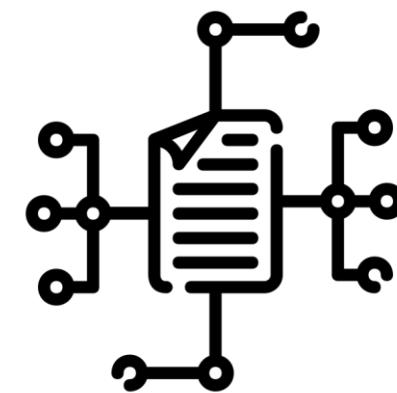
Created by Nhor
from Noun Project



Created by Start Up Graphic Design
from Noun Project



Created by DailyYouth
from Noun Project



Created by HAMEL KHALED
from Noun Project



IAWM background

"Irregular paving" by Stephen Edmonds under CC BY-SA 2.0

Internet Archive

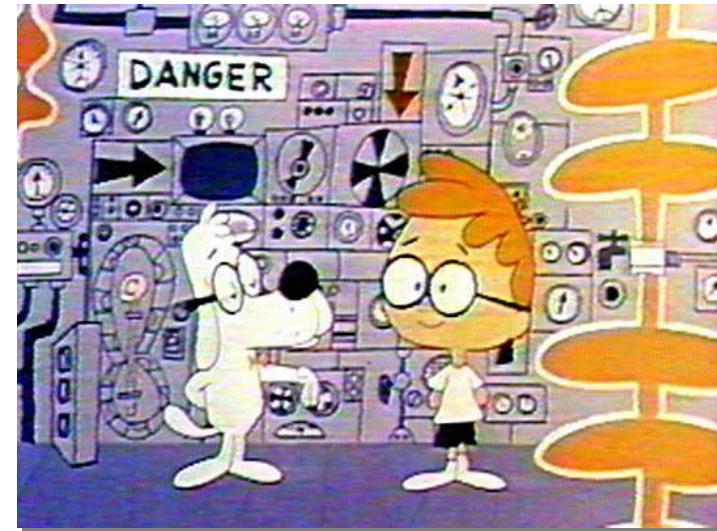
- non-profit digital library
- “universal access to all knowledge”
- provides free public access to collections of all types of digital materials



IAWM

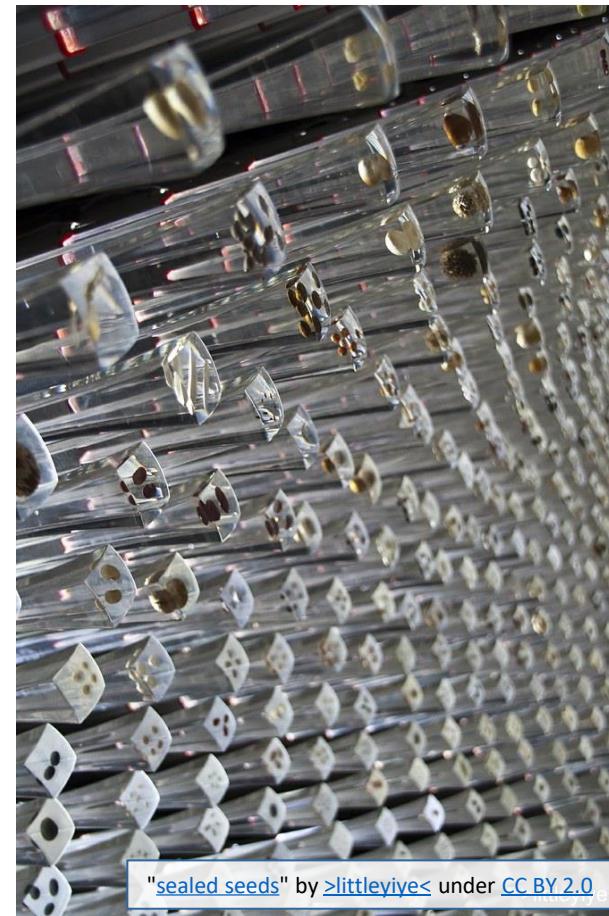
- free, open archive of websites
1996 – present
- web content is both culturally significant + ephemeral
- IAWM referenced in:
 - [a 2002 patent application](#)
 - [a 2003 PTAB proceeding](#)
 - [a 2004 U.S. federal court case](#)

INTERNET ARCHIVE
WayBack Machine

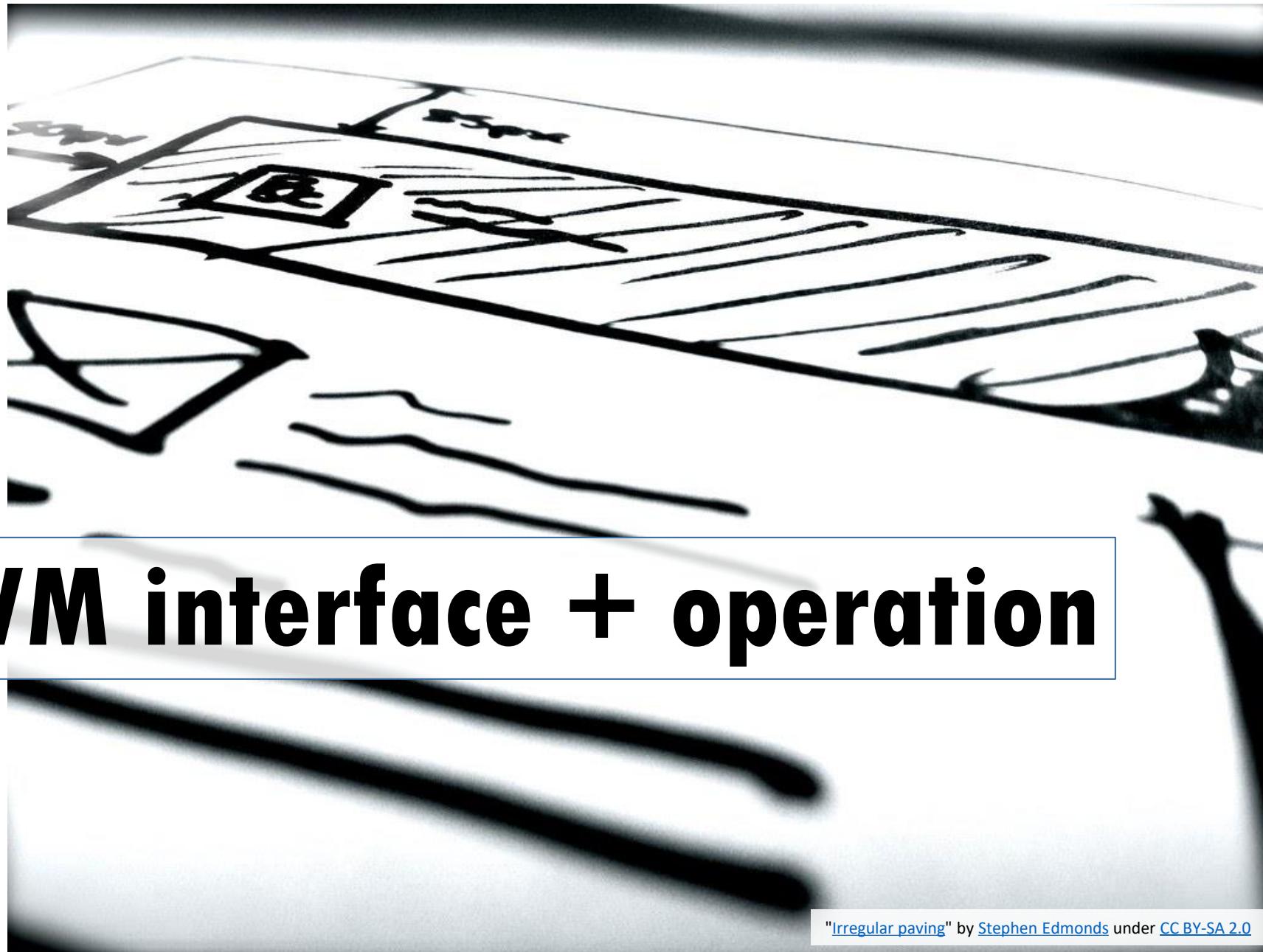


IAWM archival coverage

- “best effort” archive
- popular + more recent content is better archived
- content of interest to cultural heritage orgs is increasingly better archived
- social media less well archived
- non-public web content not archived



"sealed seeds" by [>littleyive<](#) under CC BY 2.0



IAWM interface + operation

"Irregular paving" by Stephen Edmonds under [CC BY-SA 2.0](#)

IAWM home

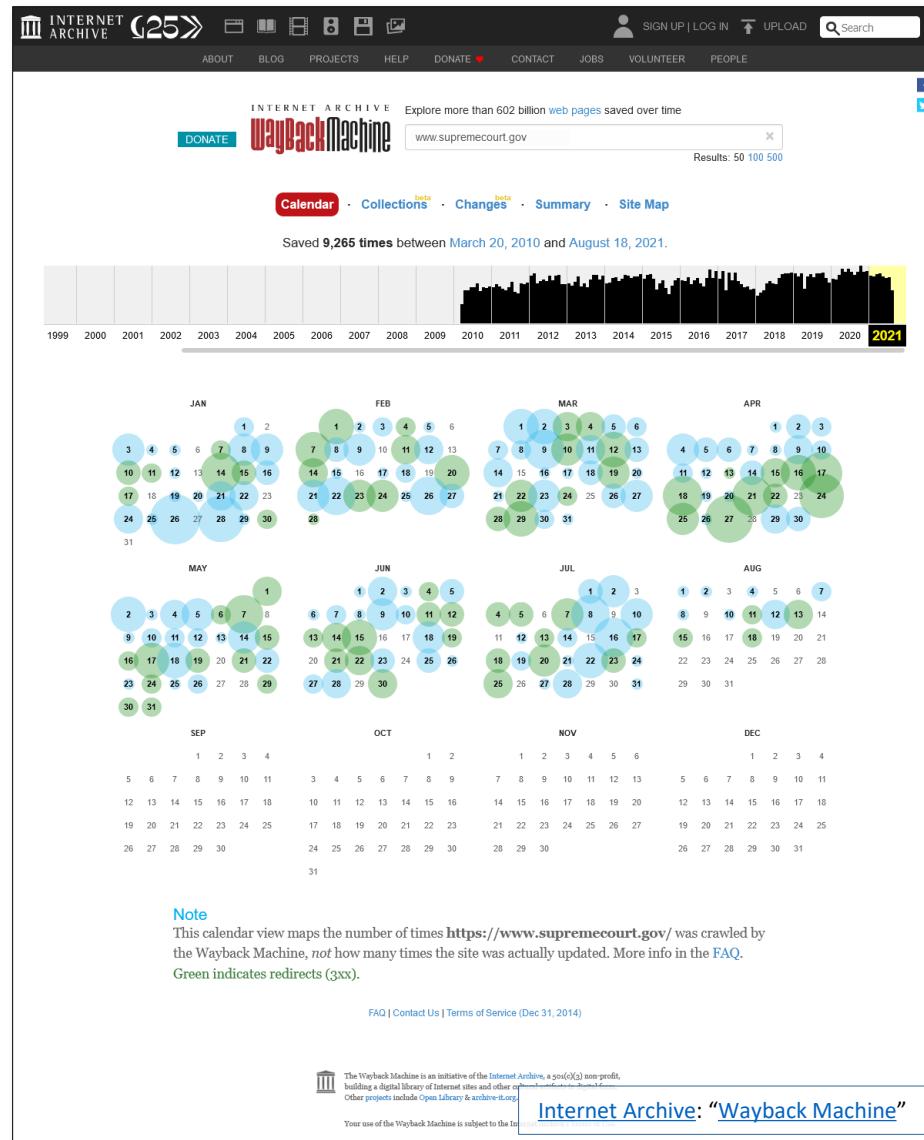
The screenshot shows the Wayback Machine homepage on the Internet Archive website. At the top, there's a navigation bar with links for ABOUT, BLOG, PROJECTS, HELP, DONATE, CONTACT, JOBS, VOLUNTEER, and PEOPLE. On the right side of the top bar are icons for SIGN UP | LOG IN, UPLOAD, and a user profile icon. Below the top bar, the Internet Archive logo and a '25' anniversary banner are visible. The main heading 'INTERNET ARCHIVE' is followed by 'Wayback Machine'. A search bar contains the placeholder 'http://'. To the right of the search bar is a 'BROWSE HISTORY' button. Below the search bar, a message says 'Explore more than 602 billion web pages saved over time'. A 'DONATE' button is located below the search bar. There are several thumbnail images of historical web pages from different years. Below these thumbnails, there are three sections: 'Tools' (with links to Wayback Machine Availability API, WordPress Broken Link Checker, and 404 Handler for Webmasters), 'Subscription Service' (describing Archive-It and its features), and 'Save Page Now' (with a URL input field and a 'SAVE PAGE' button). At the bottom of the page, there are links for FAQ, Contact Us, and Terms of Service (Dec 31, 2014). A footer bar at the very bottom contains the text 'Internet Archive: "Wayback Machine"'.

IAWM home: search box

The screenshot shows the Internet Archive Wayback Machine homepage. At the top, there's a navigation bar with links for ABOUT, BLOG, PROJECTS, HELP, DONATE, CONTACT, JOBS, VOLUNTEER, and PEOPLE. On the right side of the bar are icons for SIGN UP | LOG IN and UPLOAD. Below the navigation bar, the text "INTERNET ARCHIVE" and "Explore more than 602 billion web pages saved over time" is displayed. A large "Wayback Machine" logo is prominently featured. A search bar contains the URL "www.supremecourt.gov". To the right of the search bar is a "BROWSE HISTORY" button. Below the search bar, there's a message "Find the Wayback Machine useful? [DONATE](#)". Underneath this, there are seven small thumbnail images showing different web pages from the archive. In the bottom left, there's a section titled "Tools" with links to "Wayback Machine Availability API", "Build your own tools.", "WordPress Broken Link Checker", "Banish broken links from your blog.", "404 Handler for Webmasters", and "Help users get where they were going.". In the bottom center, there's a section titled "Subscription Service" with a link to "Archive-It enables you to capture, manage and search collections of digital content without any technical expertise or hosting facilities. Visit [Archive-It to build and browse the collections.](#)". In the bottom right, there's a section titled "Save Page Now" with a "https://

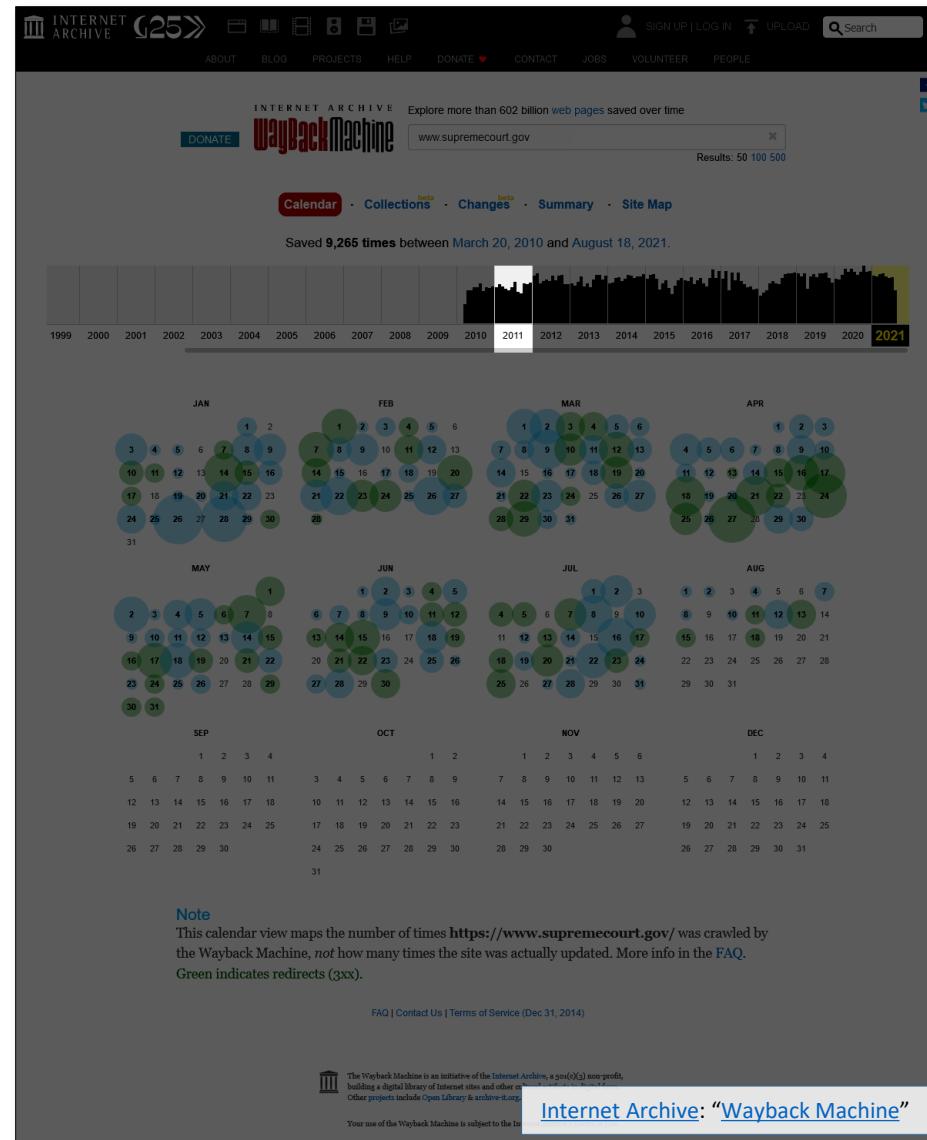
IAWM calendar page

- landing page presents archival coverage for specified web address for year selected in timeline
- bubble size indicates relative number of captures for that date
- bubble color indicates status code provided by the web server to the IA archiving agent
 - blue means a successful retrieval, with no errors
 - green means a redirect was encountered



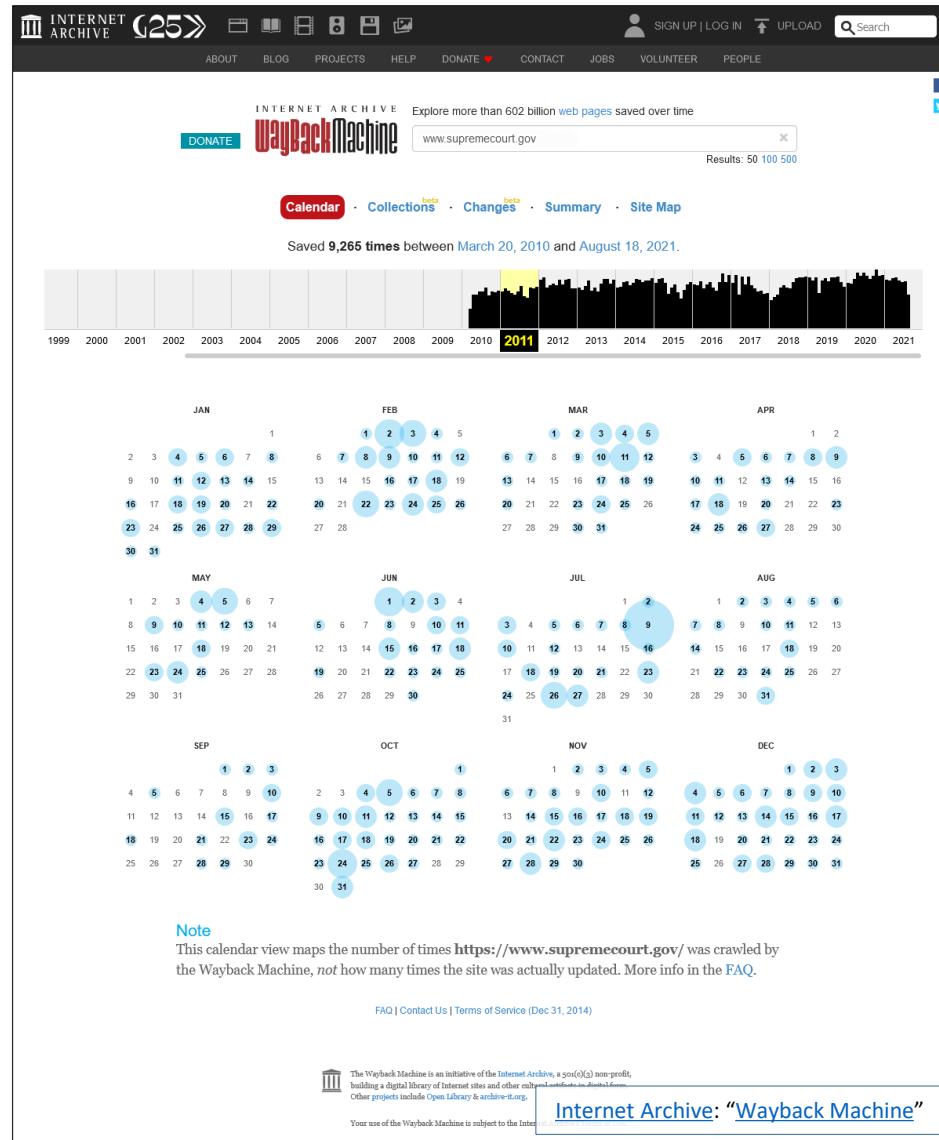
IAWM calendar page: captures by year

- click to another year in the timeline to change the calendar view below
- let's click to 2011



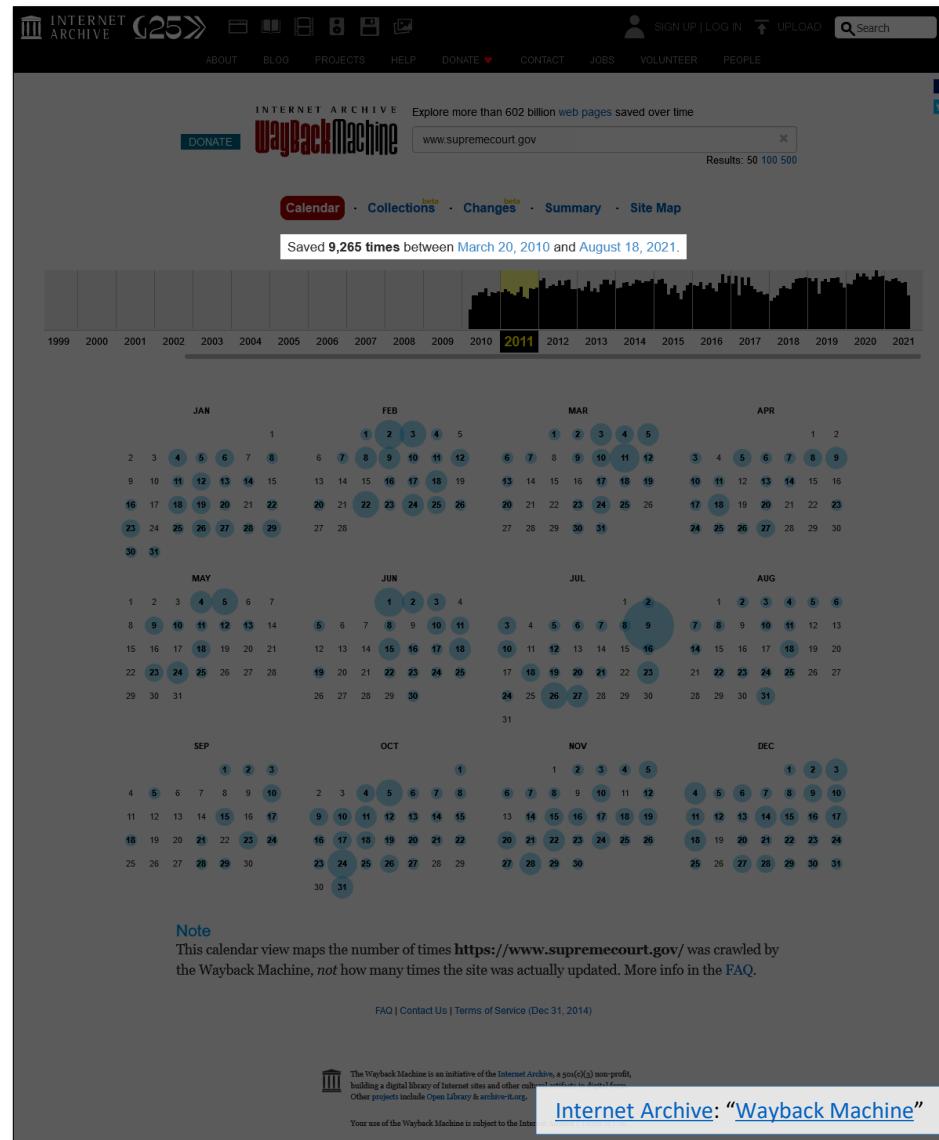
IAWM calendar page

- note that there are fewer captures in 2011, as indicated by:
 - shorter bars on the timeline histogram
 - generally smaller bubbles than in 2021
- general trend is that websites are better archived over time
- let's take a closer look at some of the other interface elements



IAWM calendar page: captures range

- number of captures for the specified web address + their date range is displayed at the top
- links are provided to the first + last captures in the date range



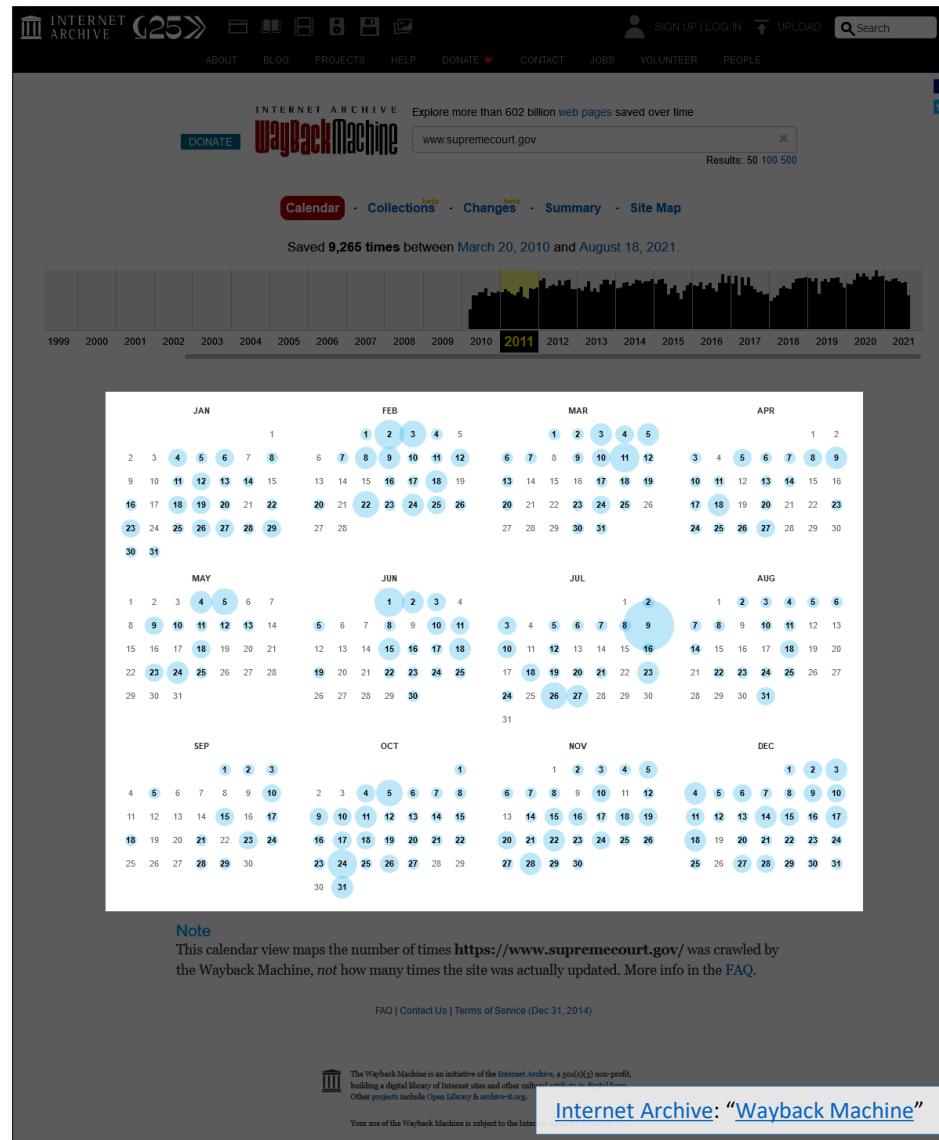
IAWM calendar page: timeline histogram

- the timeline histogram provides a visual summary of the relative number of captures over time
- each year segment has 12 columns – one for each month
- the year displayed in detail below is highlighted in yellow in the timeline



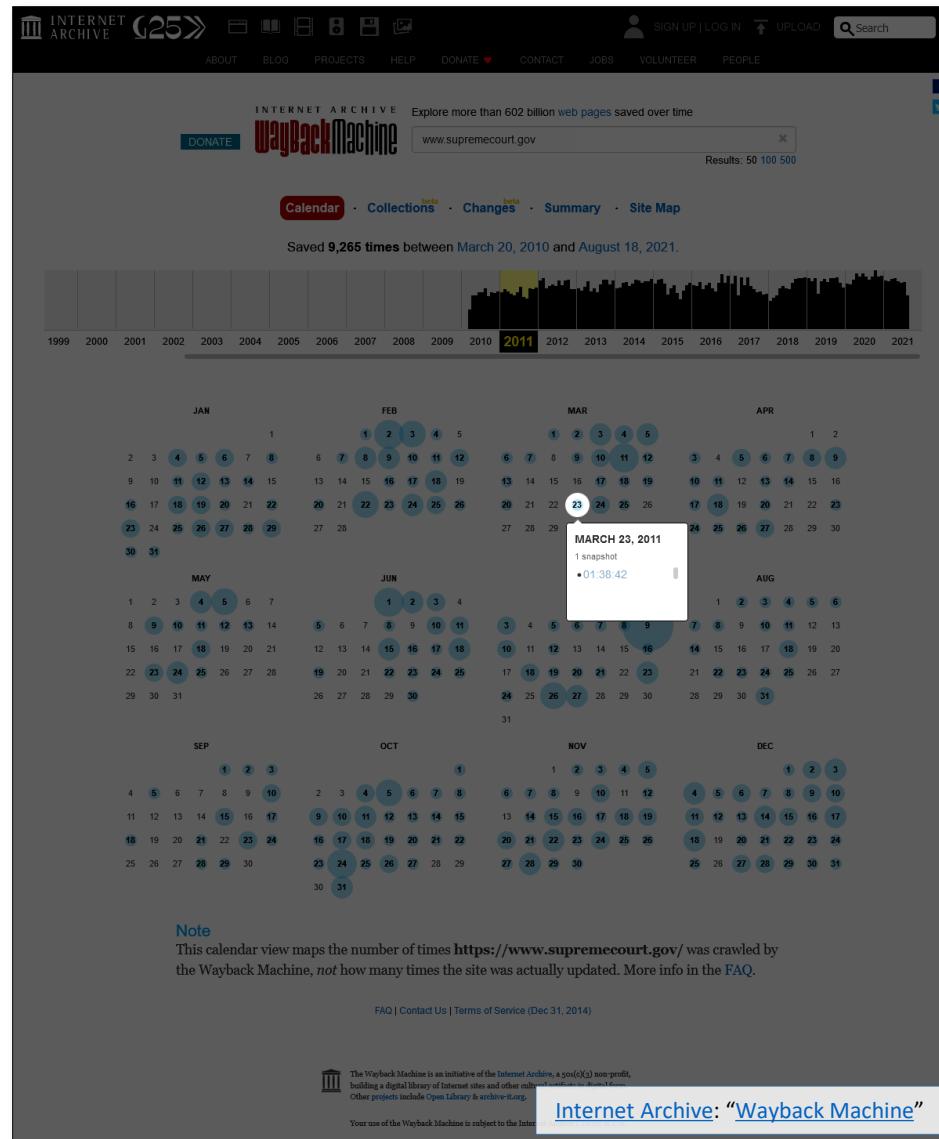
IAWM calendar page: calendar

- archival coverage for every day of the year selected in the timeline
- this is the 2011 calendar



IAWM calendar page: 23 March 2011 capture

- hovering over a date for which there is at least one capture presents the number of captures + capture time(s)
- clicking on a capture time takes you to the re-presentation of the resource captured on that date at that time
- let's click through



IAWM resource page

- IAWM resource page for www.supremecourt.gov for the 23 March 2011 capture
- note that archived webpages have a top-justified IAWM overlay banner to:
 - remind the user they're within the IAWM context
 - facilitate navigation
 - provide additional info about the current capture + other captures of the resource located at the same web address
- let's look at the IAWM banner

The screenshot shows the Supreme Court of the United States homepage. At the top, there is a Wayback Machine overlay banner with the text "INTERNET ARCHIVE Wayback Machine https://www.supremecourt.gov/ 9,265 captures 20 Mar 2010 - 18 Aug 2021" and a timeline from 2010 to 2012. The main content area features the Supreme Court logo and the title "SUPREME COURT OF THE UNITED STATES". On the left, there is a sidebar with links to "Supreme Court Documents" (Docket, Oral Arguments, Merits Briefs, Bar Admissions, Court Rules, Case Handling Guides, Opinions, Orders and Journals) and "Supreme Court Information" (About the Supreme Court, Visiting the Court, Public Information, Jobs, Links). The central part of the page includes a "Supreme Court of the United States" calendar for March 2011, which highlights Argument Days (red), Non-argument Days (blue), Conference Days (green), and Holidays (yellow). Below the calendar is a "List of cases for argument on 3/22/2011" section. At the bottom, there is a "What's New" section and footer links.

IAWM banner



- IAWM overlay banner for the resource page for the 23 March 2011 capture of www.supremecourt.gov
- offers many of the same features as the calendar page: search box, captures range, timeline histogram

IAWM banner: temporal navigation



- yellow highlighted date is the capture date of the currently accessed web resource
- to the left and right are temporal navigation links for different intervals – from top to bottom:
 - one month ago / one month ahead
 - last preceding capture / next successive capture
 - one year ago / one year ahead
- for less-frequently captured web resources, intervals may be longer than a month or year



Full-Text Search (of Home Pages)

["Typeset"](#) by [Paul Hudson](#) under [CC BY 2.0](#)

full-text search (of home pages)

The screenshot shows the Wayback Machine homepage within the Internet Archive interface. At the top, there's a navigation bar with links for ABOUT, BLOG, PROJECTS, HELP, DONATE, CONTACT, JOBS, VOLUNTEER, and PEOPLE. On the right side of the header are icons for SIGN UP | LOG IN, UPLOAD, and a user profile. Below the header, the Internet Archive logo and a '25' anniversary banner are visible. The main content area features the Wayback Machine logo and a search bar with the placeholder 'http://'. A message encourages users to explore over 602 billion web pages. Below the search bar are several thumbnail previews of archived web pages from different years. The page is divided into sections: 'Tools' (Wayback Machine Availability API, WordPress Broken Link Checker, 404 Handler for Webmasters), 'Subscription Service' (Archive-It service description), and 'Save Page Now' (a form for saving a specific page). At the bottom, there are links for FAQ, Contact Us, Terms of Service, and a link to the Internet Archive's "Wayback Machine" page.

full-text search (of home pages): enter search string

The screenshot shows the Internet Archive Wayback Machine homepage. At the top, there's a navigation bar with links for ABOUT, BLOG, PROJECTS, HELP, DONATE, CONTACT, JOBS, VOLUNTEER, and PEOPLE. On the right side of the bar are icons for SIGN UP | LOG IN and UPLOAD. Below the navigation bar, the text "INTERNET ARCHIVE" and "25" is displayed, along with small icons representing different media types. The main heading "INTERNET ARCHIVE" is followed by "WayBack Machine". A search bar contains the text "supreme court united states". To the right of the search bar is a "BROWSE HISTORY" button. Below the search bar, there's a message "Explore more than 602 billion web pages saved over time". A "DONATE" button is visible. Further down, there are several thumbnail images of archived web pages. On the left, there's a section titled "Tools" with links to "Wayback Machine Availability API", "Build your own tools.", "WordPress Broken Link Checker", "Banish broken links from your blog.", "404 Handler for Webmasters", and "Help users get where they were going.". In the center, there's a section titled "Subscription Service" with information about Archive-It and a "Save Page Now" feature. The "Save Page Now" section includes a URL input field with "https://", a "SAVE PAGE" button, and a descriptive text about capturing web pages. At the bottom, there are links for "FAQ", "Contact Us", and "Terms of Service (Dec 31, 2014)". A blue box at the bottom right contains the text "Internet Archive: "Wayback Machine"".

full-text search (of home pages): search results

The screenshot shows the Wayback Machine interface on the Internet Archive website. The search query "supreme court united states" is entered in the search bar, with results showing 115,227 captures from 2000 to 2015. Below the search bar are social media sharing links for Facebook and Twitter.

Results:

- http://supremecourtus.gov/**
supreme court
15,448 captures from 2000 to 2015 | Site stats
- http://supremecourt.gov/**
U.S. supreme court
12,141 captures from 2010 to 2016 | Site stats
- http://scotusblog.com/**
scotusblog
103,093 captures from 2004 to 2016 | Site stats
- http://united-states-supreme-court.skyairline.net/**
united-states-supreme-court.skyairline.net
0 captures from 2005 to 2005 | Site stats

Internet Archive: "Wayback Machine"

full-text search (of home pages): top two results

The screenshot shows the Wayback Machine search interface on the Internet Archive website. The search query "supreme court united states" is entered in the search bar, resulting in 115,227 capture(s) from 2000 to 2015. The results are listed in descending order of captures.

- http://supremecourtus.gov/**
supreme court
15,448 captures (from 2000 to 2015) | Site stats
- http://supremecourt.gov/**
U.S. supreme court
12,141 captures (from 2010 to 2016) | Site stats
- http://scotusblog.com/**
scotusblog
103,093 captures (from 2004 to 2016) | Site stats
- http://united-states-supreme-court.skyairline.net/**
united-states-supreme-court.skyairline.net
0 captures (from 2005 to 2005) | Site stats

At the bottom right of the page, there is a link: "Internet Archive: [Wayback Machine](#)".

full-text search (of home pages): capture counts for top two results

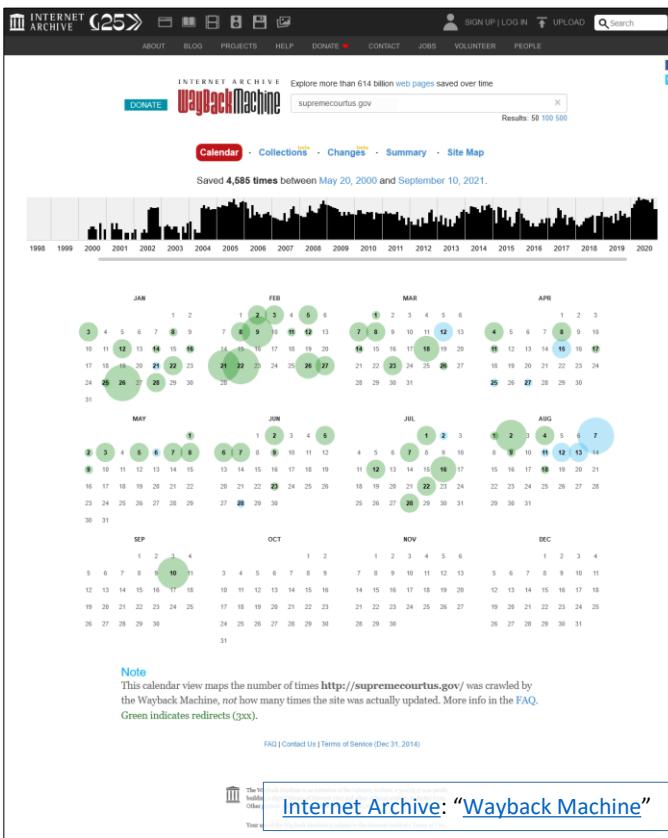
The screenshot shows the Wayback Machine interface on the Internet Archive website. The search query "supreme court united states" is entered in the search bar. The results page displays four top captures:

- http://supremecourtus.gov/**
supreme court
15,448 captures from 2000 to 2015 | Site stats
115,227 capture(s) from 2000 to 2015 | Site stats
- http://supremecourt.gov/**
u.s. supreme court
12,141 captures from 2010 to 2016 | Site stats
444,249 capture(s) from 2010 to 2016 | Site stats
- http://scotusblog.com/**
scotusblog
103,093 captures from 2004 to 2016 | Site stats
1,315,924 capture(s) from 2004 to 2016 | Site stats
- http://united-states-supreme-court.skyairline.net/**
united-states-supreme-court.skyairline.net
0 captures from 2005 to 2005 | Site stats

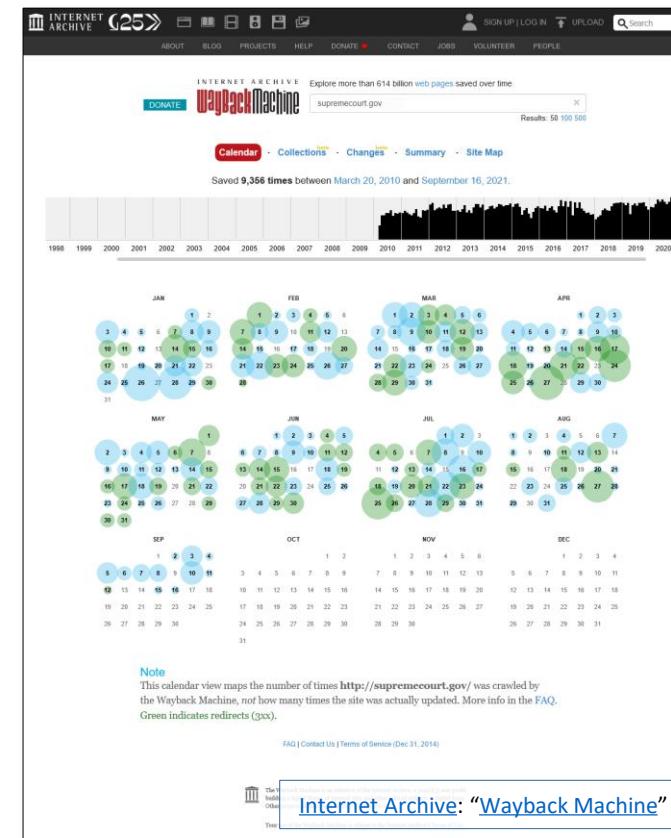
At the bottom right of the results page, there is a link: "Internet Archive: [Wayback Machine](#)".

IAWM calendar pages

supremecourtus.gov

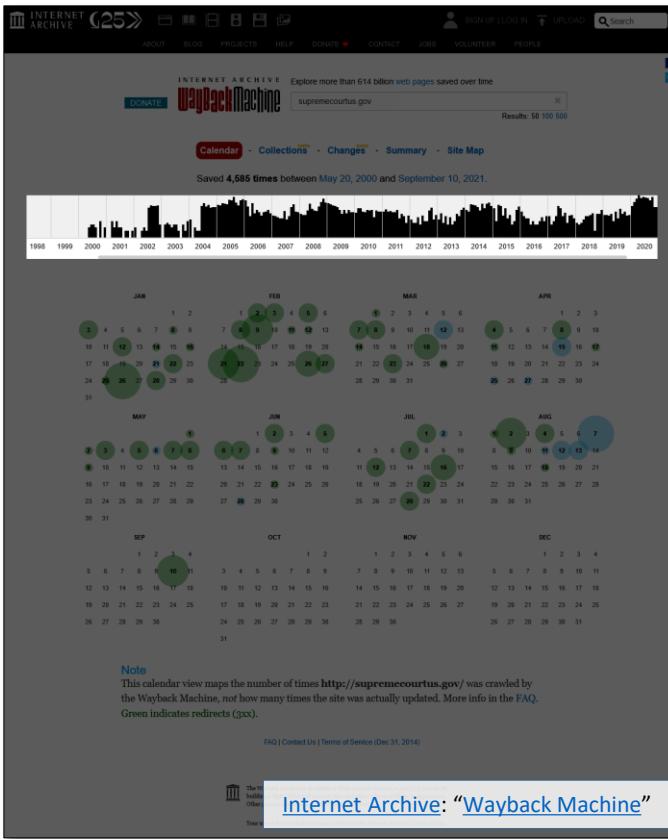


supremecourt.gov

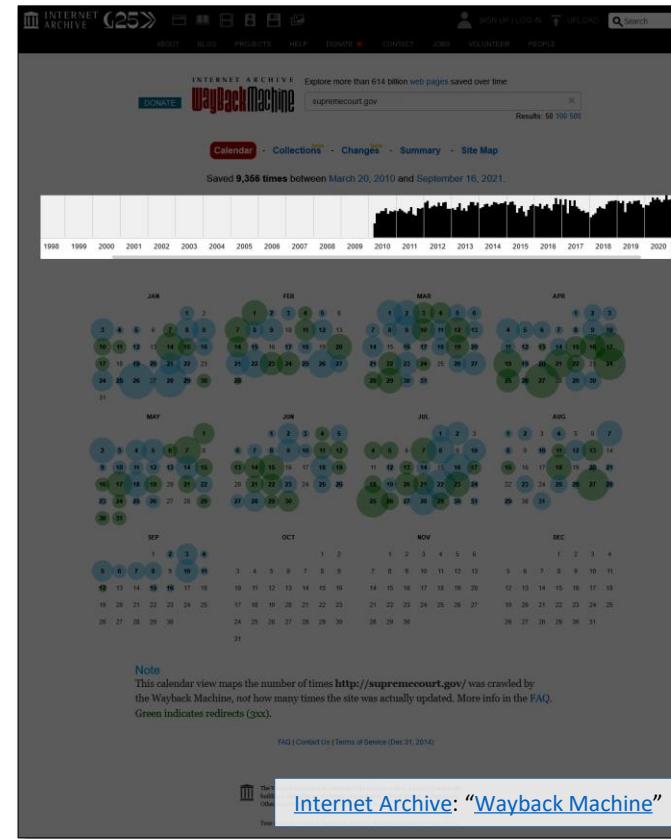


IAWM calendar pages: timeline histograms

[supremecourtus.gov](#)



[supremecourt.gov](#)



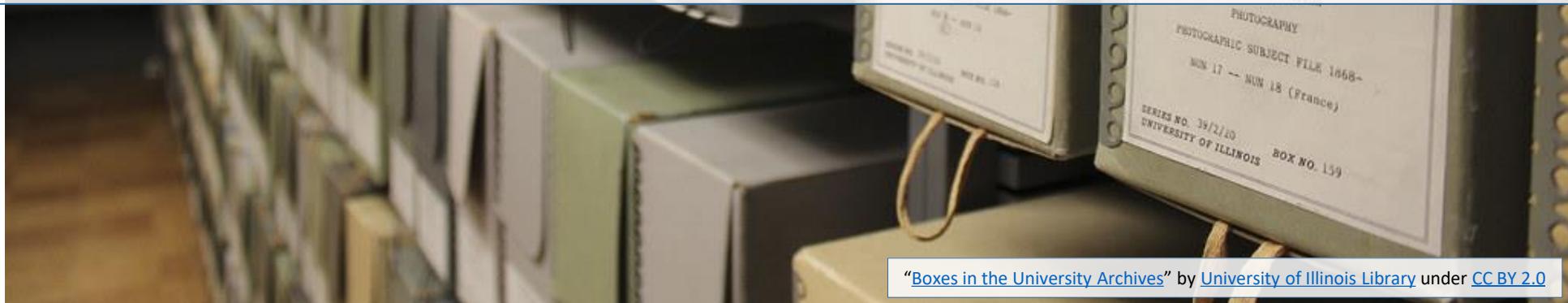
IAWM resource page

- this is the first capture for supremecourtus.gov, from 20 May 2000





Collections Tool + Full-Text Search

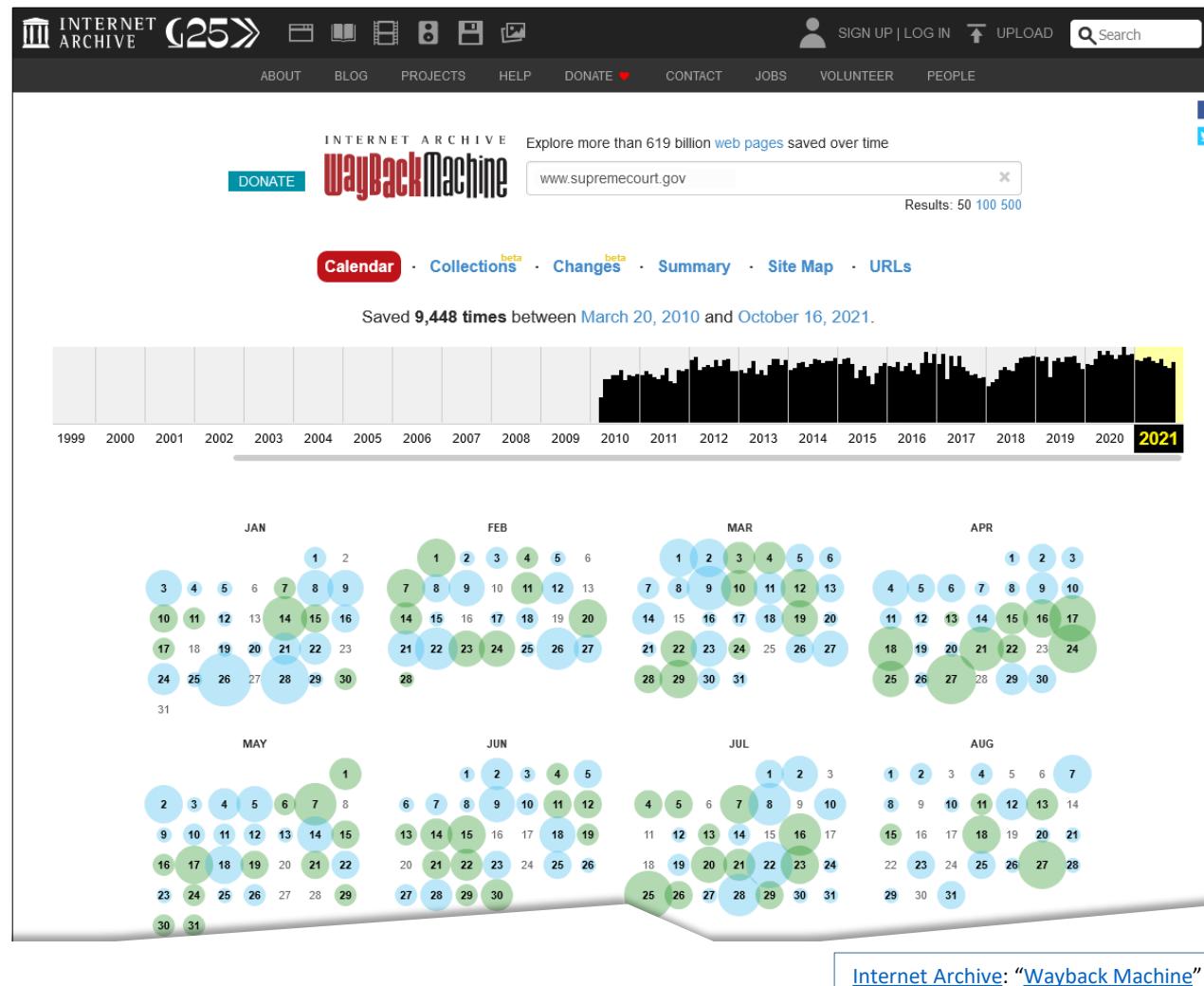


["Boxes in the University Archives"](#) by [University of Illinois Library](#) under [CC BY 2.0](#)

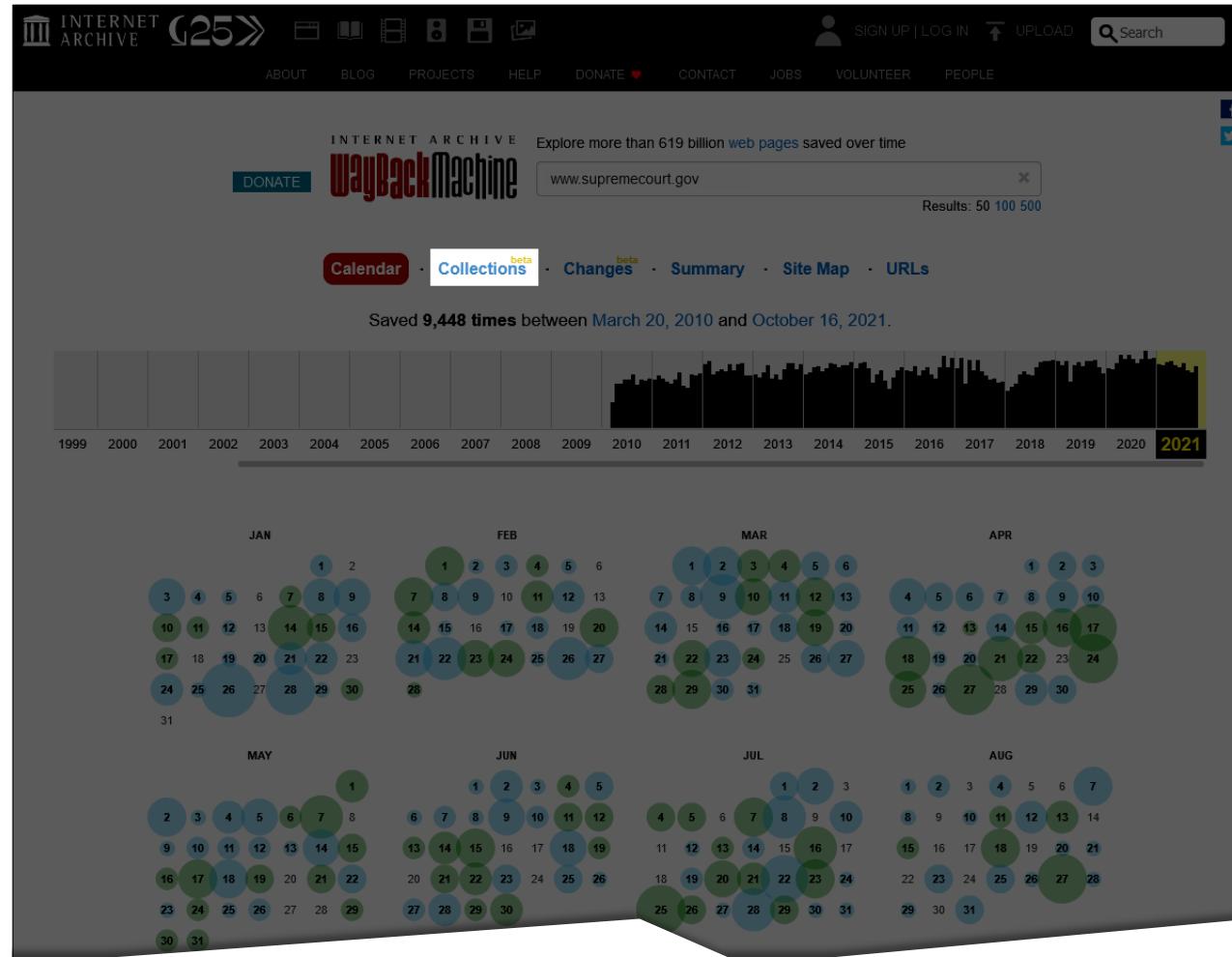
Collections tool

- IAWM captures have diverse provenance:
 - [web-wide crawls](#)
 - [contract crawls](#)
 - [Archive-It crawls](#)
 - [Alexa donations](#)
 - [ArchiveTeam crawls](#)
 - [Save Page Now](#)
- Collections tool shows sources of captures
- why does provenance matter?
 - some sources have more focused crawls, indicating quality
 - some sources offer additional search + discovery options

IAWM calendar page

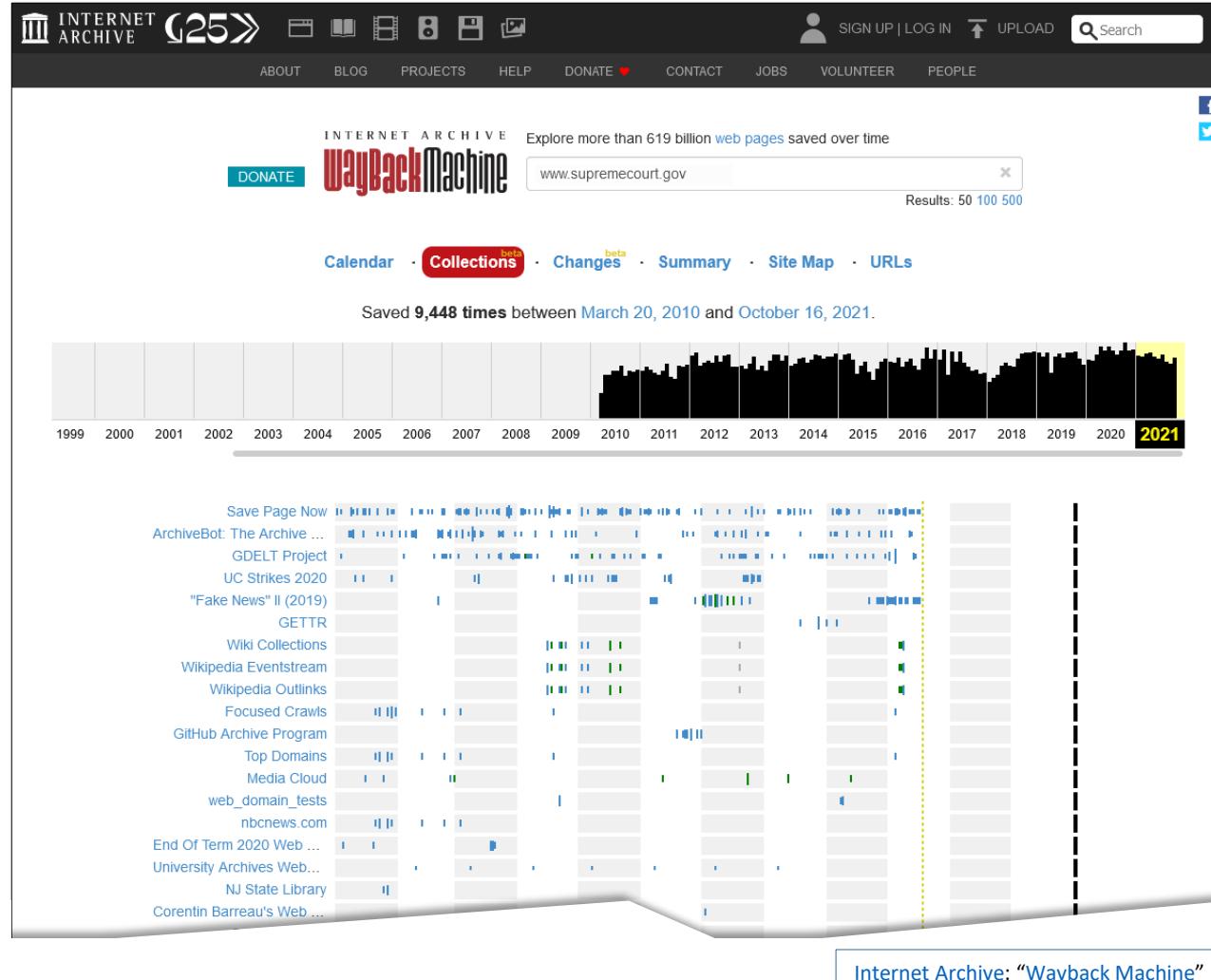


IAWM calendar page



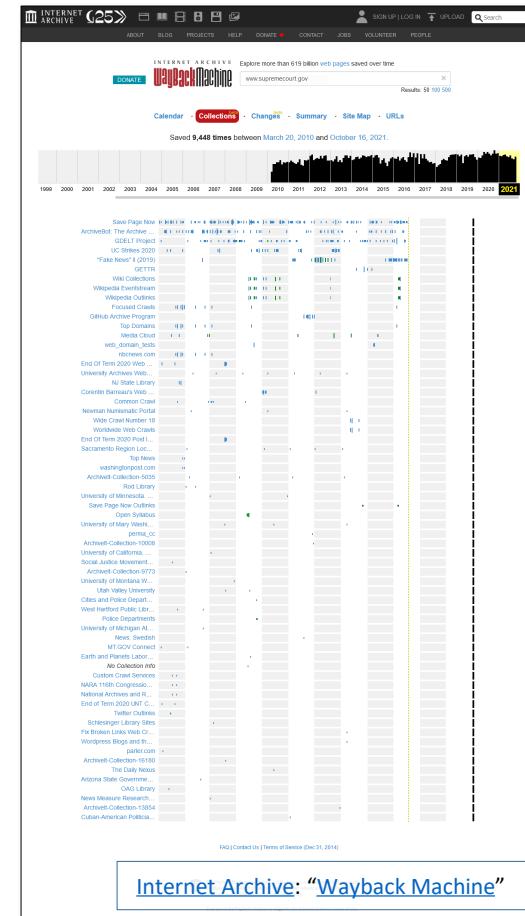
Internet Archive: "Wayback Machine"

Collections tool



Collections tool

- hover over individual collection names
- look for string in link target web address: *ArchiveIt-Collection*
- Archive-It is IA's subscription web archiving service
- used by 100s of orgs to run selective web crawls + curate topical collections
- has its own discovery portal w/ full-text search



Internet Archive: "Wayback Machine"

Archive-It full-text search

The screenshot shows the Archive-It search interface. At the top, there is a navigation bar with links for HOME, EXPLORE, LEARN MORE, and CONTACT US. On the right side of the header, there are social media icons for Facebook, Twitter, and WordPress, along with a 'Login' button. Below the header, a banner states: 'The leading web archiving service for collecting and accessing cultural heritage on the web. Built at the Internet Archive'. To the right of the banner is a small icon of a classical building.

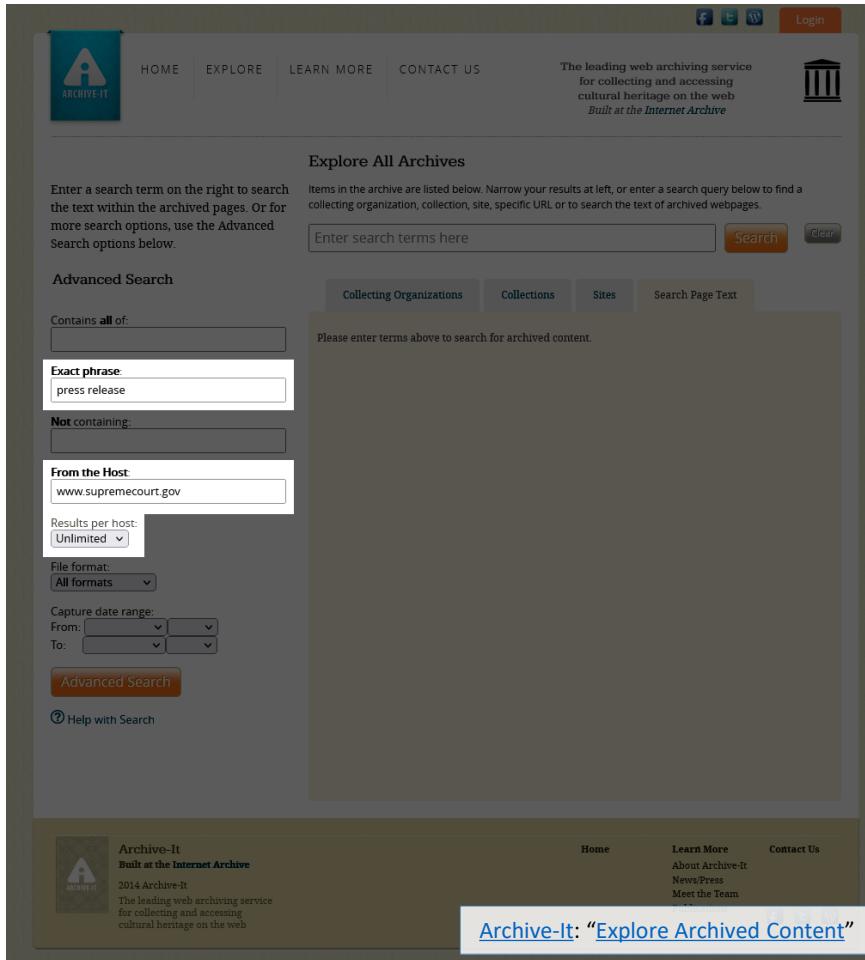
The main content area is titled 'Explore All Archives'. It features a search bar with placeholder text 'Enter search terms here' and buttons for 'Search' and 'Clear'. Below the search bar are four tabs: 'Collecting Organizations', 'Collections', 'Sites', and 'Search Page Text'. A message below the tabs says 'Please enter terms above to search for archived content.' On the left side of the page, there is a 'Advanced Search' section with several input fields and dropdown menus. These fields include:

- 'Contains all of:' with an input field.
- 'Exact phrase' with an input field.
- 'Not containing:' with an input field.
- 'From the Host' with an input field and placeholder 'ex. www.archive-it.org'.
- 'Results per host:' with a dropdown menu set to '1 (default)'.
- 'File format:' with a dropdown menu set to 'All formats'.
- 'Capture date range:' with two dropdown menus for 'From:' and 'To:'.

At the bottom of the advanced search section are two buttons: 'Advanced Search' and 'Help with Search'.

At the very bottom of the page, there is a footer with the Archive-It logo, the text 'Archive-It Built at the Internet Archive', and links for 'Home', 'Learn More', and 'Contact Us'. A call-to-action button at the bottom right says 'Archive-It: "Explore Archived Content"'.

Archive-It full-text search



Archive-It full-text search

The screenshot shows the Archive-It website interface. At the top, there's a navigation bar with links for HOME, EXPLORE, LEARN MORE, and CONTACT US. On the right side of the header, there are social media icons for Facebook, Twitter, and WordPress, along with a 'Login' button. Below the header, a teal sidebar on the left contains the 'ARCHIVE-IT' logo and several search filters: 'Contains all of:' (with an empty input field), 'Exact phrase:' (with 'press release' typed in), 'Not containing:' (with an empty input field), 'From the Host:' (with 'www.supremecourt.gov' typed in), 'Results per host:' (set to 'Unlimited'), 'File format:' (set to 'All formats'), and 'Capture date range:' (with dropdown menus for 'From:' and 'To:'). To the right of the sidebar, the main content area is titled 'Explore All Archives'. It features a search bar with the placeholder 'Enter search terms here' and buttons for 'Search' and 'Clear'. Below the search bar, there are tabs for 'Collecting Organizations', 'Collections', 'Sites', and 'Search Page Text', with 'Search Page Text' being the active tab. The results page displays a list of 231 total results, with 'Page 1 of 12' currently selected. The first result is a link to 'Home - Supreme Court of the United States' from the 'California Political Blogs' collection. The second result is a link to 'Press Release 04/29/13' from the 'Georgetown Law Center' collection.

Items in the archive are listed below. Narrow your results at left, or enter a search query below to find a collecting organization, collection, site, specific URL or to search the text of archived webpages.

Enter search terms here

Collecting Organizations Collections Sites Search Page Text

Page 1 of 12 (231 Total Results)

Sort By: Best Match

Home - Supreme Court of the United States
Collection: California Political Blogs By University of California Libraries
URL: <http://www.supremecourt.gov/>
This text was captured on Apr 21, 2013 [Show All Captures](#)
Press release regarding the DOMA and Prop 8 arguments audio and transcript release .
Content: application/xhtml+xml Size: 78 KB

Press Release 04/29/13
Collection: Georgetown Law Center By Georgetown Law Library
URL: <http://www.supremecourt.gov/ctrules/2013revisedrules.pdf>
This text was captured on May 02, 2013 [Show All Captures](#)
FOR IMMEDIATE RELEASE For Further Information Contact: April 29, 2013 Kathy Arberg at (202) 479-3211 The Supreme Court of the United States has adopted a revised version of the Rules of the Court.
Content: application/pdf Size: 145 KB

Archive-It: "<https://archive-it.org/explore/?show=ArchivedPages...>"

Changes Tool

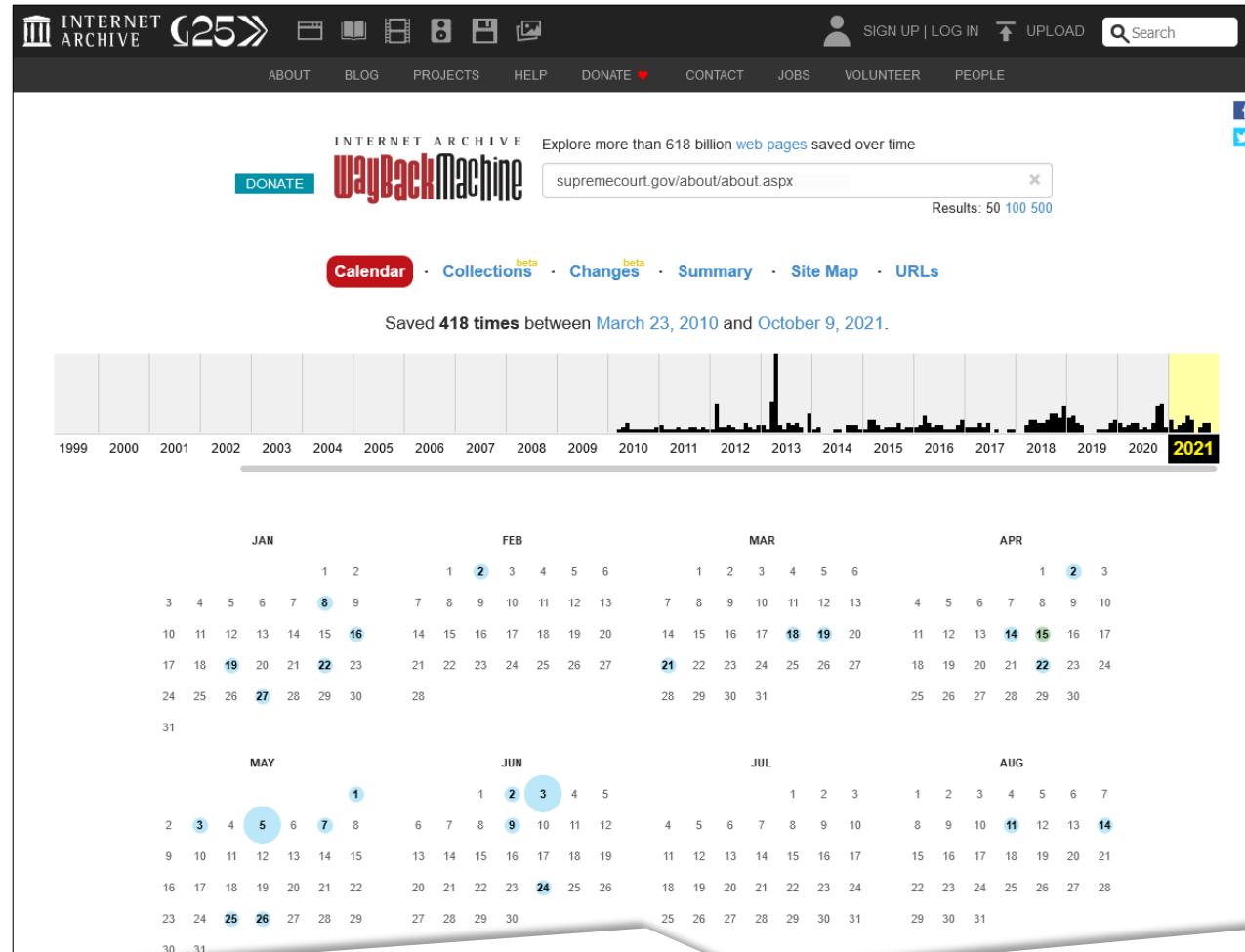


[“the before-after-situation” by Michael Mueller under CC BY 2.0](#)

Changes tool

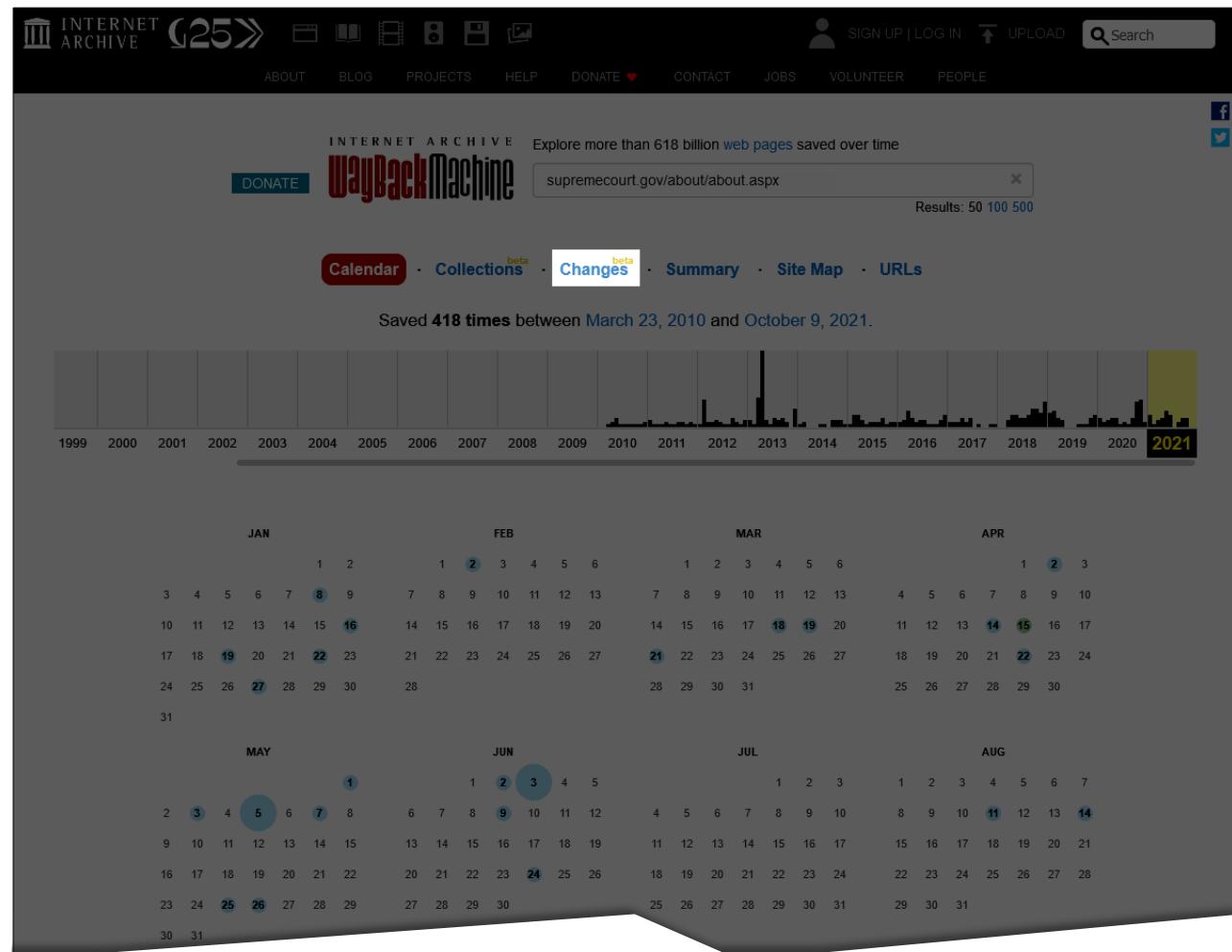
- flags differences in text b/t 2 captures of same web page
- caveats:
 - doesn't consider non-textual elements
 - doesn't account for intermediate changes
 - changes may not matter for legal issue
- use to:
 - identify when a web page changed
 - quickly visualize the text changes over time
 - establish when web page text was substantially identical

IAWM calendar page



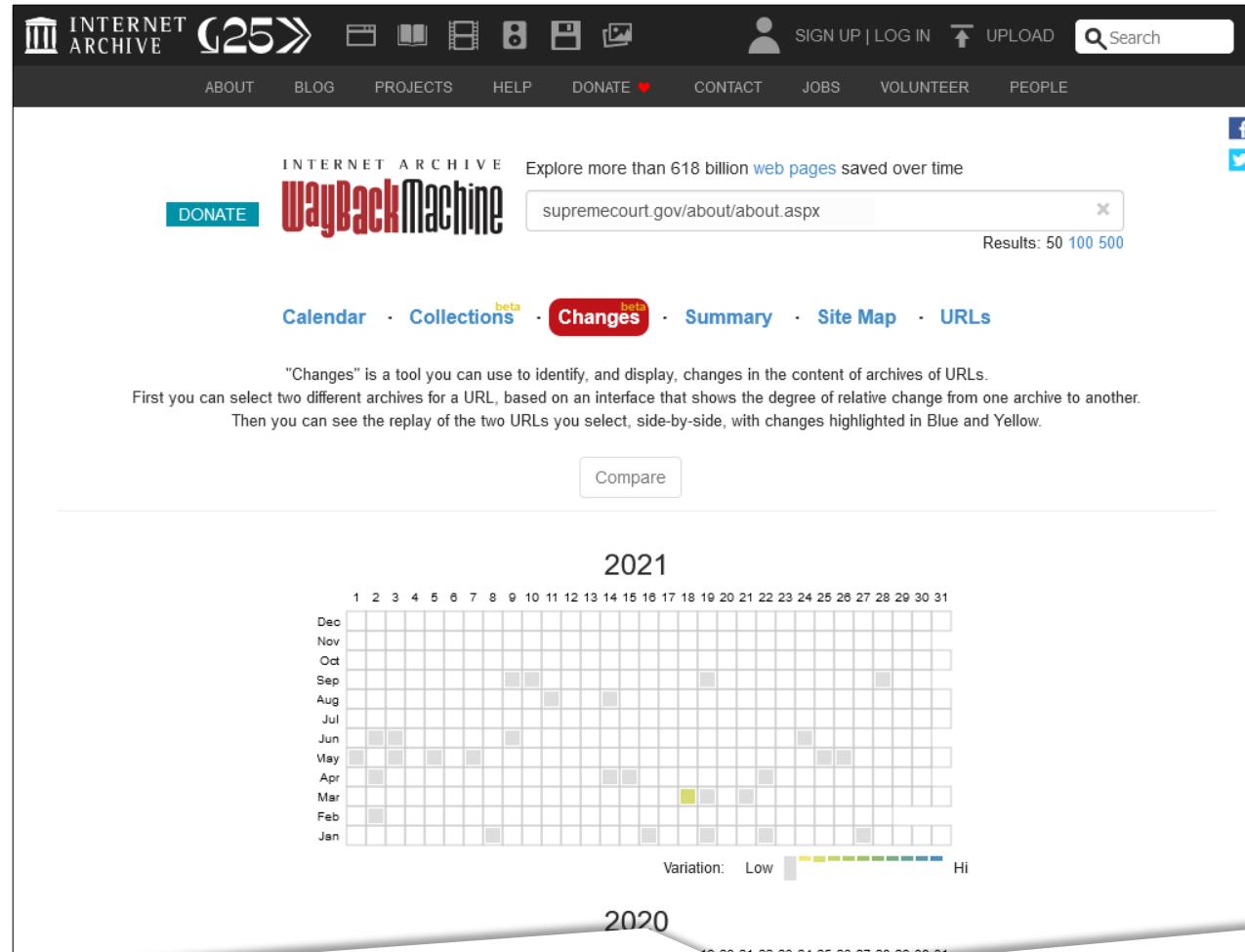
Internet Archive: "Wayback Machine"

IAWM calendar page



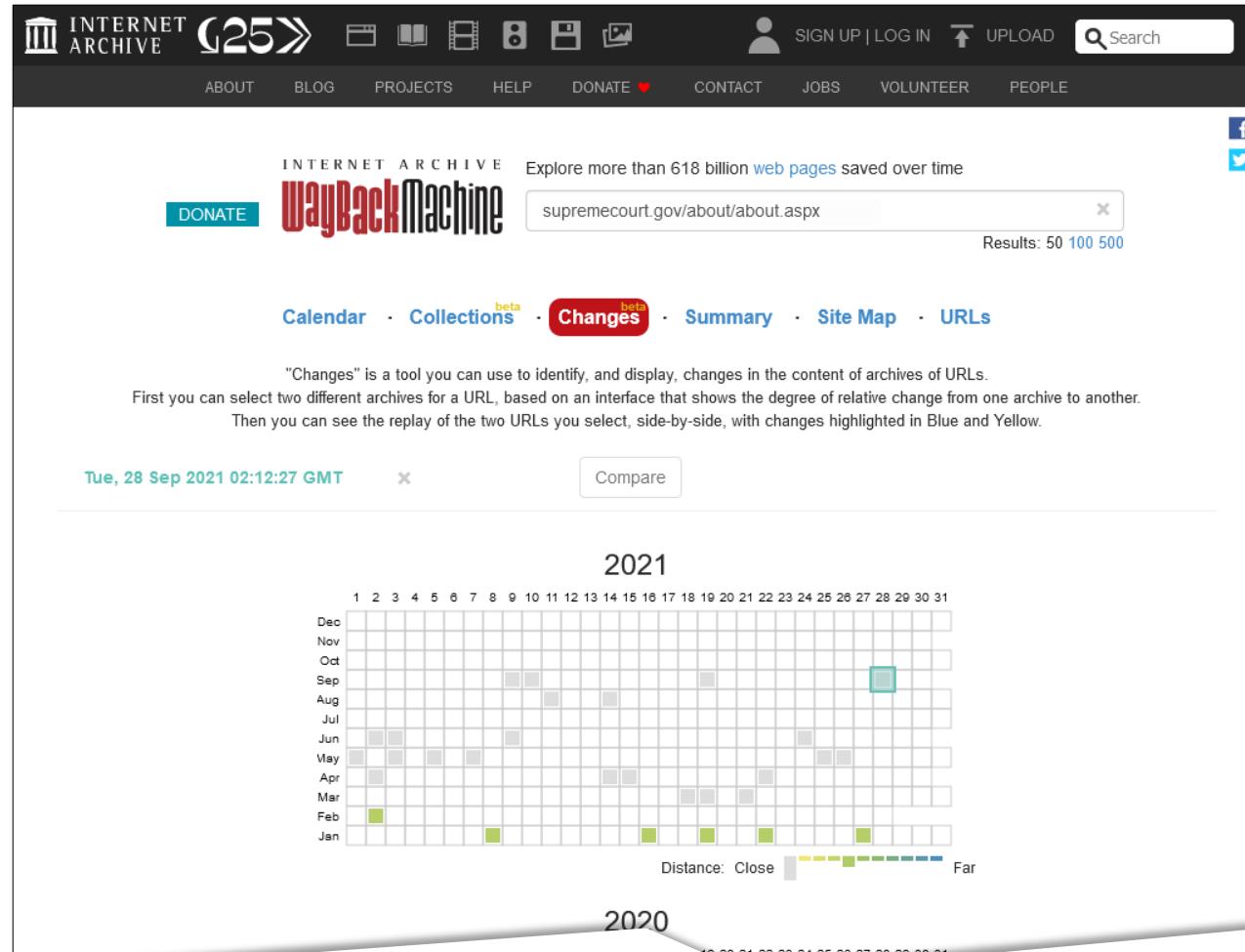
Internet Archive: "Wayback Machine"

Changes tool



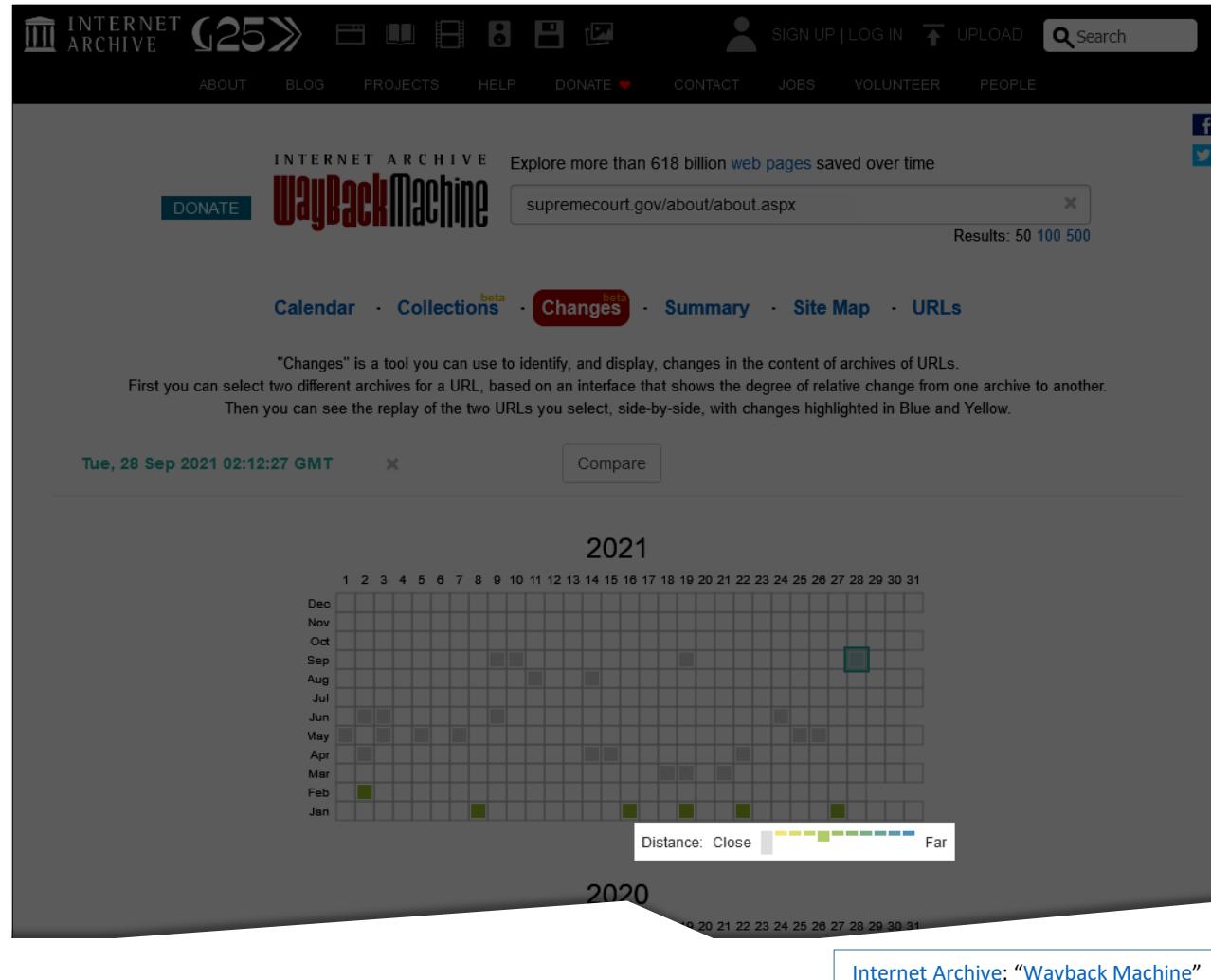
Internet Archive: "Wayback Machine"

Changes tool: choose 28 September 2021 capture

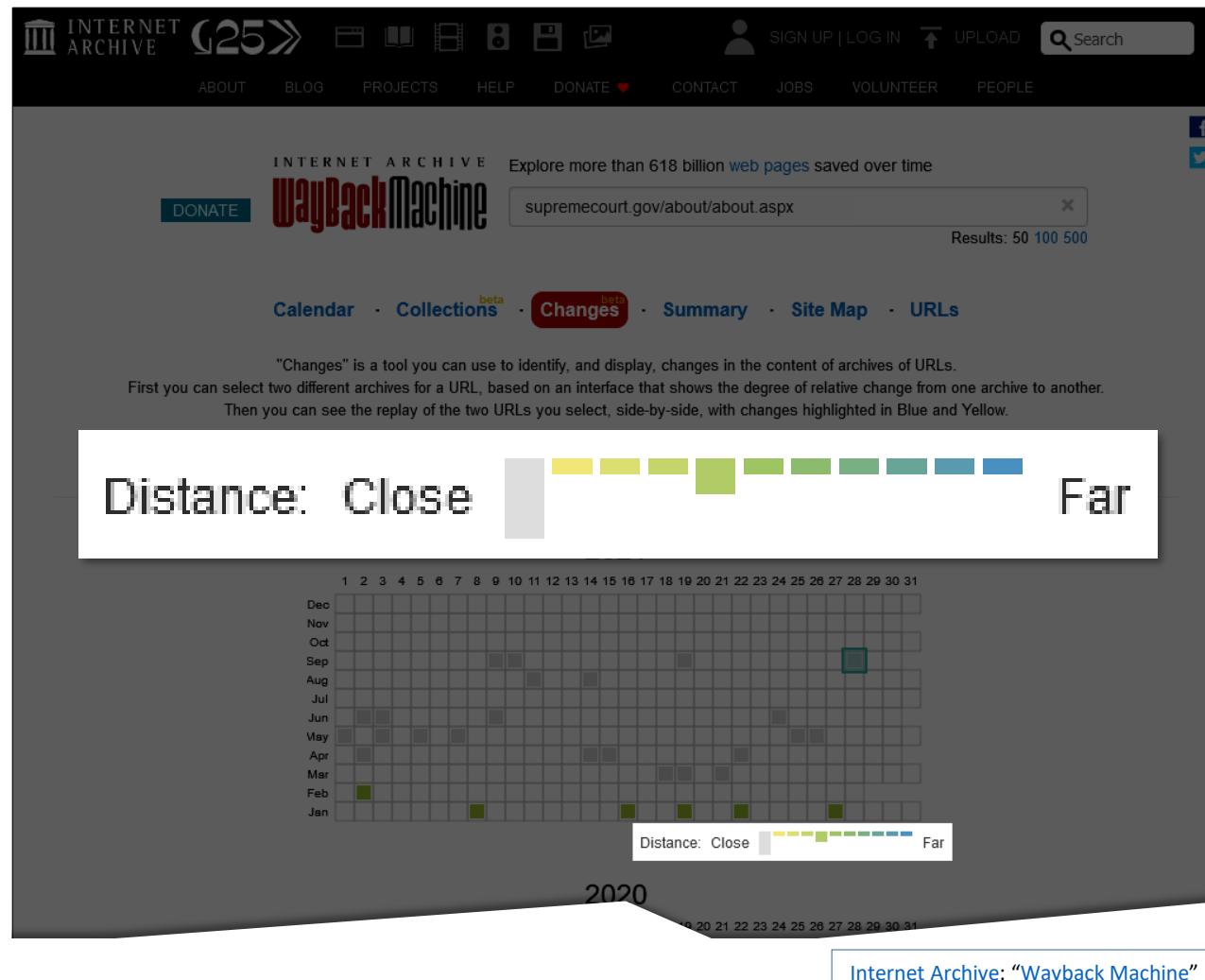


Internet Archive: "Wayback Machine"

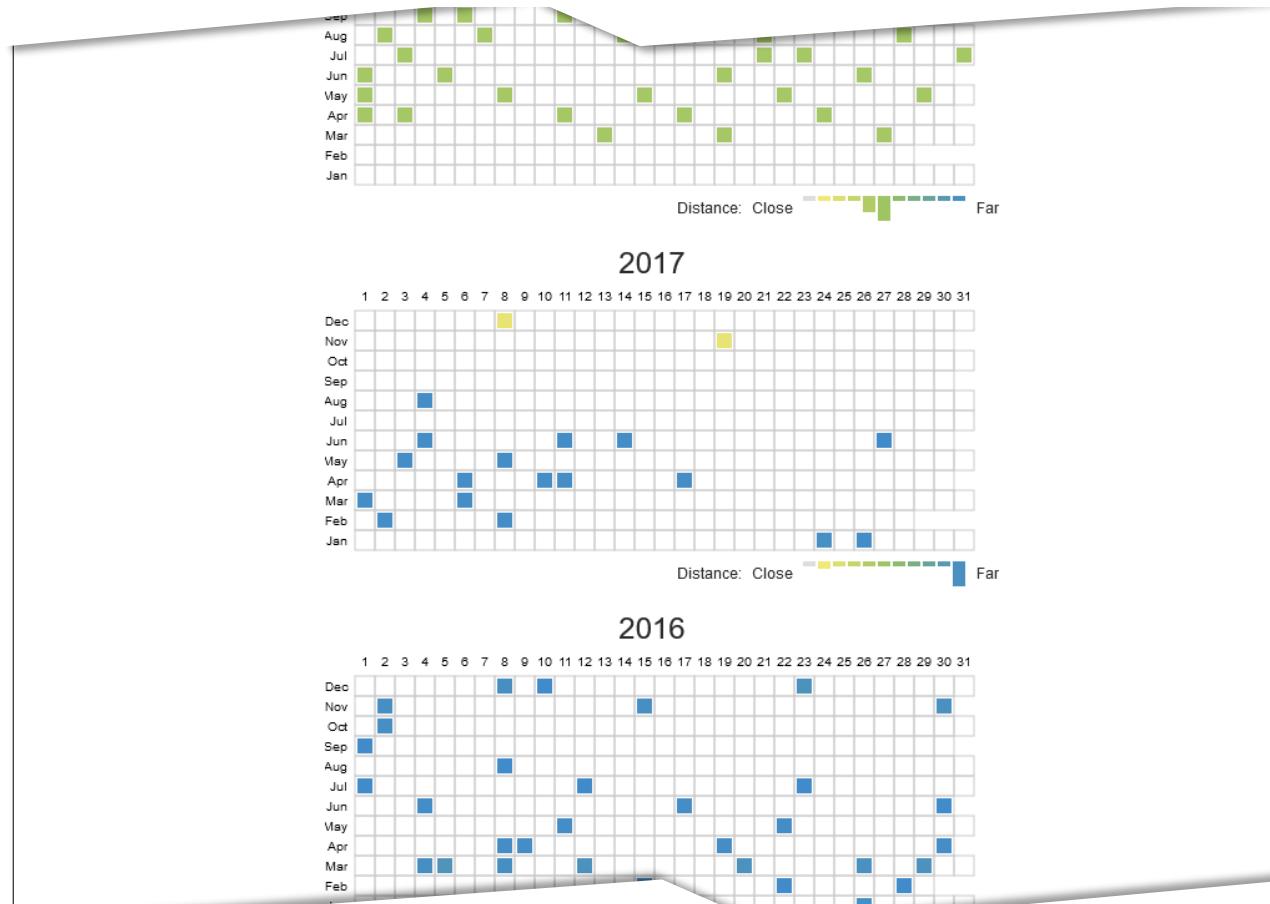
Changes tool: degree of difference key



Changes tool: degree of difference key

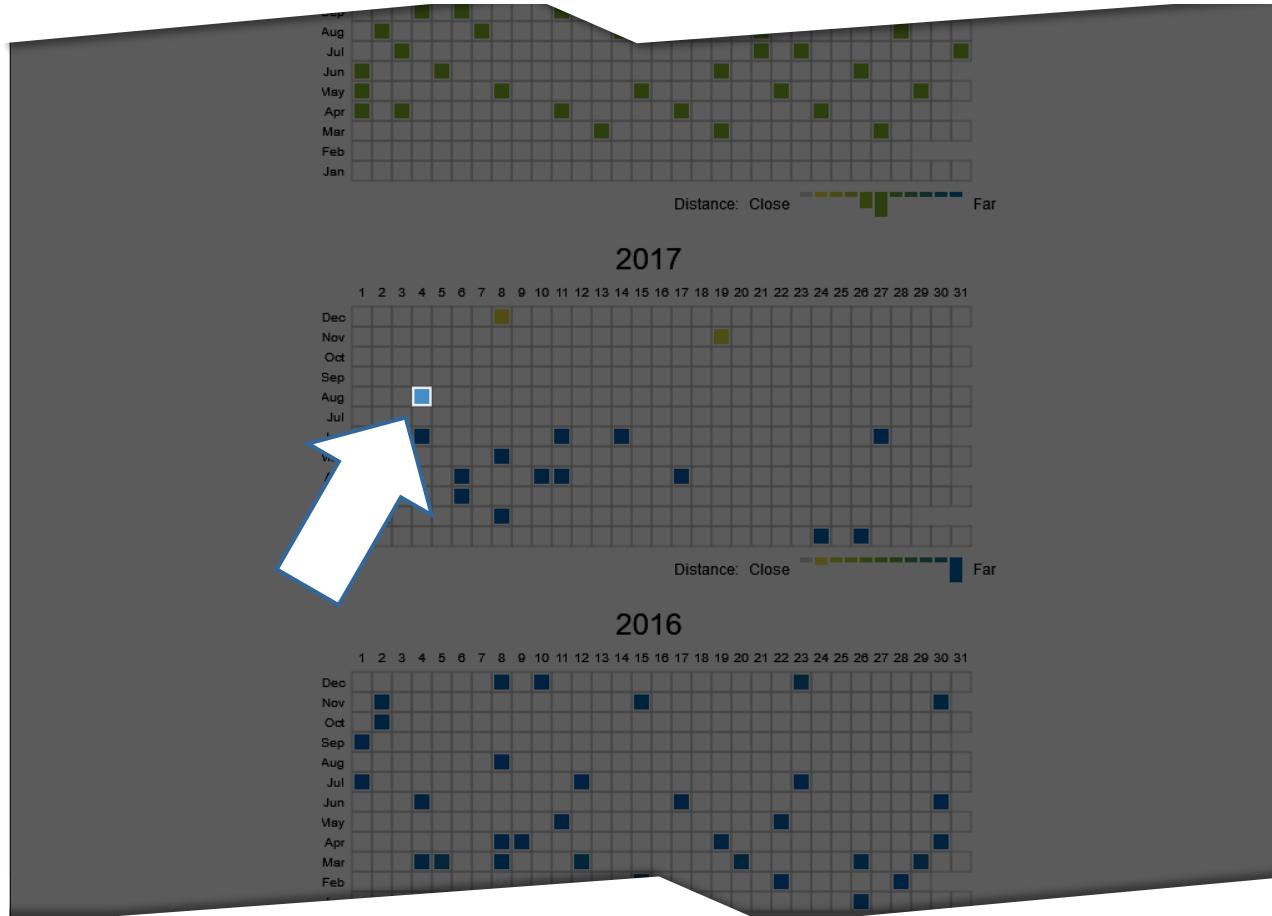


Changes tool: difference from 2017 captures



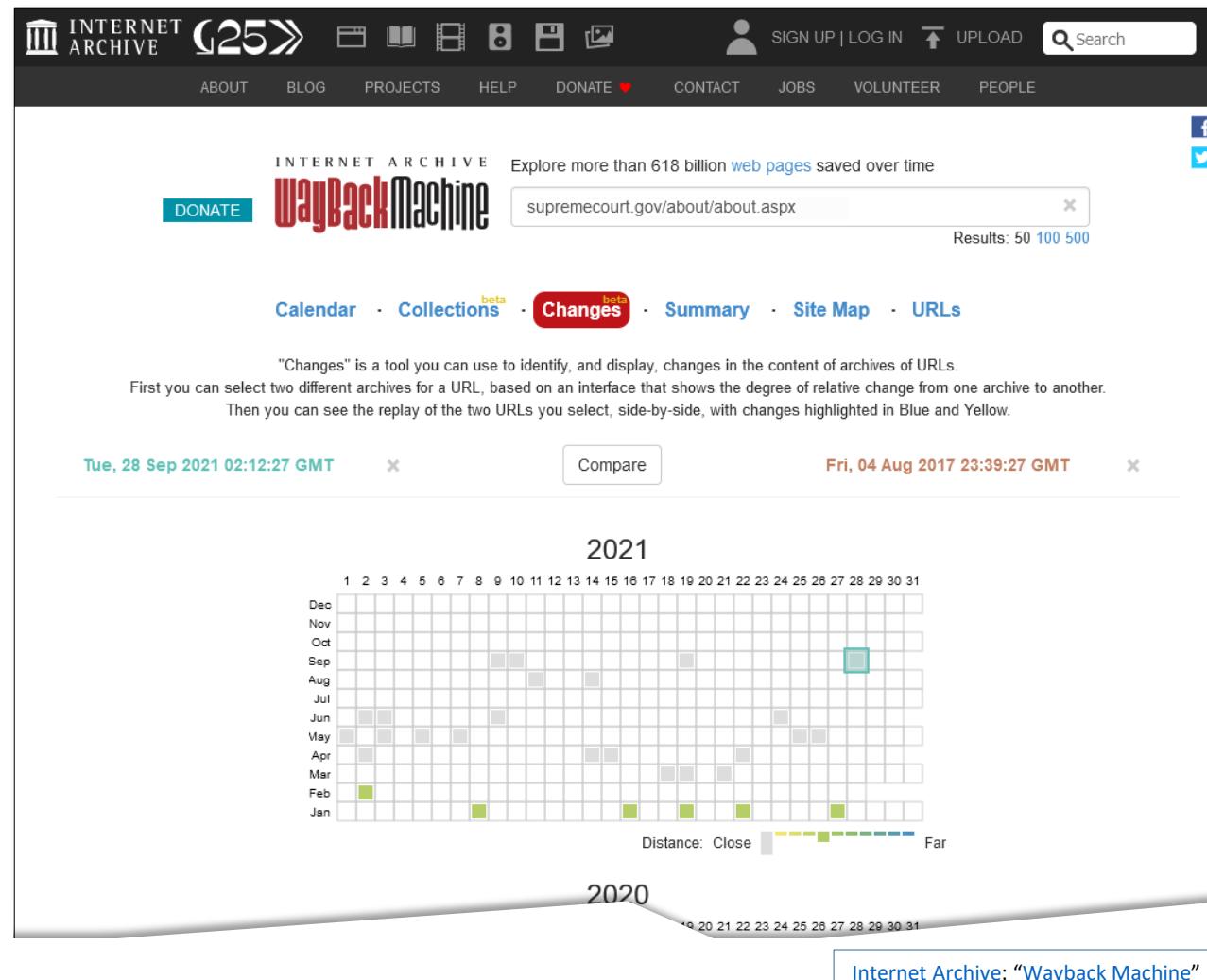
Internet Archive: ["Wayback Machine"](#)

Changes tool: compare w/ 4 August 2017 capture



Internet Archive: ["Wayback Machine"](#)

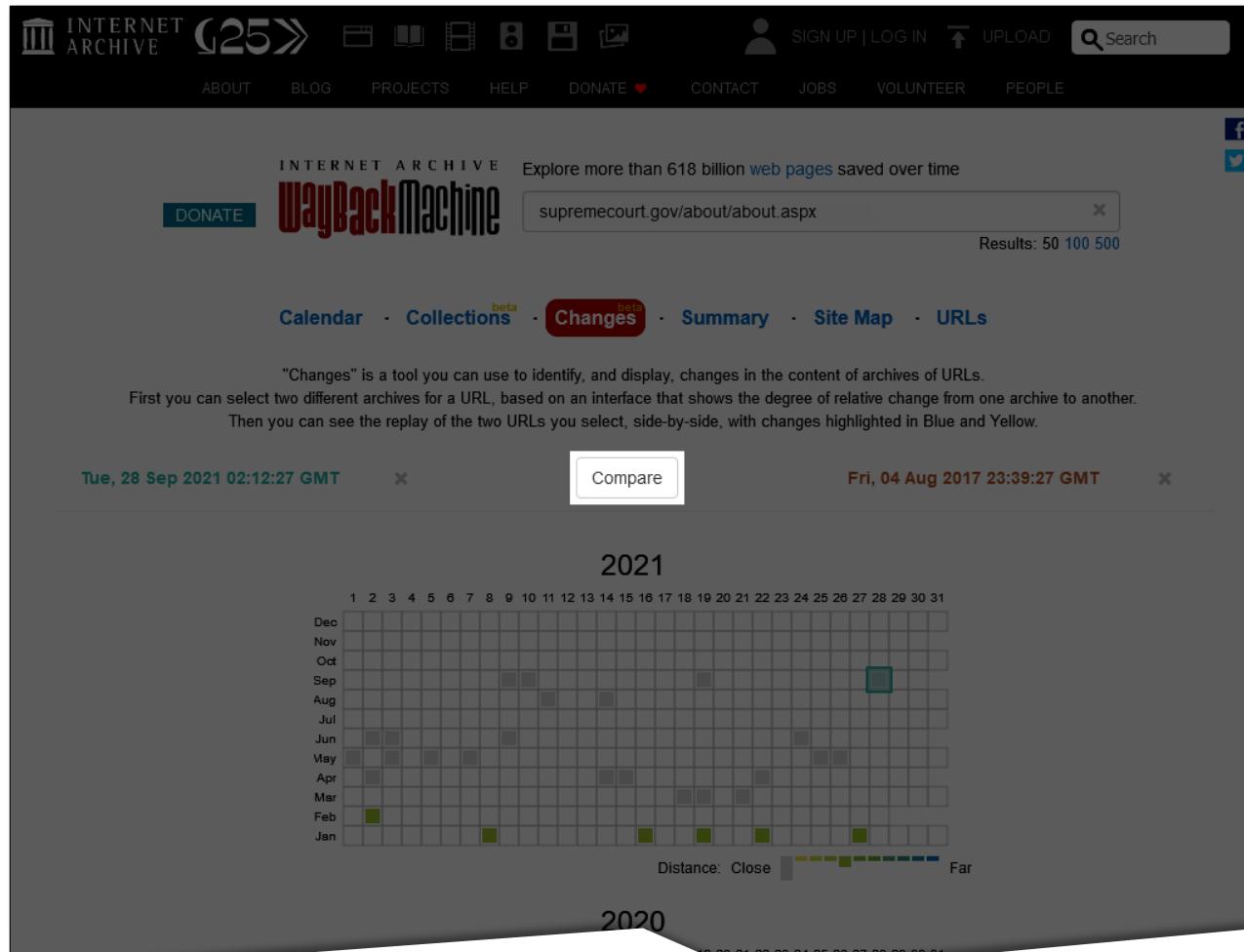
Changes tool: two captures selected



Changes tool: two captures selected



Changes tool: click *Compare*



Internet Archive: "Wayback Machine"

Changes tool: compare 28 Sep. 2021 + 4 Aug. 2017 captures

The screenshot displays a comparison interface on the Internet Archive Wayback Machine. At the top, it shows the Wayback Machine logo and navigation links for WEB, BOOKS, VIDEO, AUDIO, SOFTWARE, and IMAGES. There are also links for SIGN UP | LOG IN, UPLOAD, and a search bar.

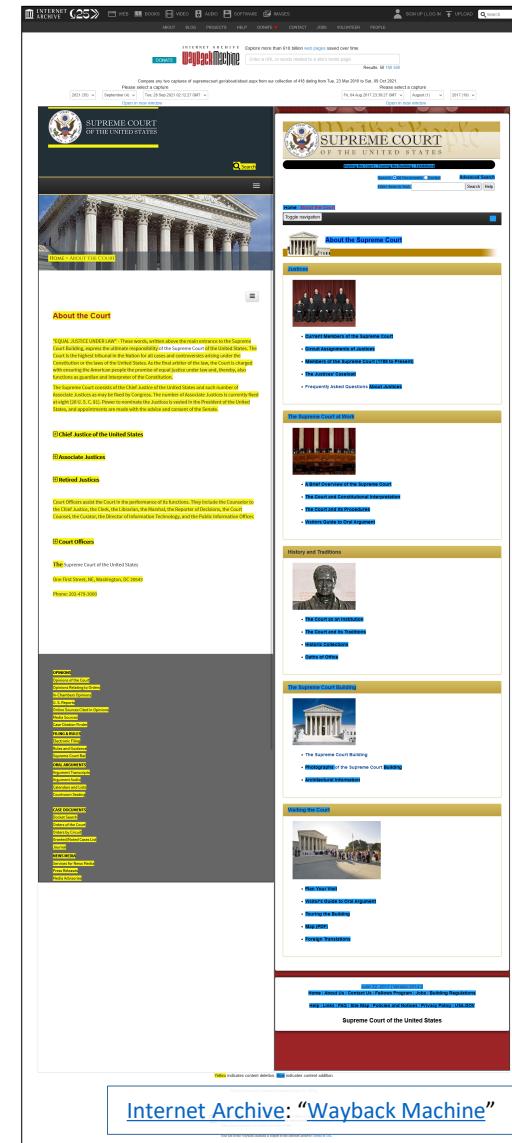
The main content area has two side-by-side comparisons. On the left, a dark-themed capture from September 28, 2021, shows the Supreme Court building and a yellow "About the Court" button. Below it, the "About the Court" section contains text about the Court's responsibilities and its role as guardian and interpreter of the Constitution. A yellow box highlights the text: "'EQUAL JUSTICE UNDER LAW' - These words, written above the main entrance to the Supreme Court Building, express the ultimate responsibility of the Supreme Court of the United States. The Court is the highest tribunal in the Nation for all cases and controversies arising under the Constitution or the laws of the United States. As the final arbiter of the law, the Court is charged with ensuring the American people the promise of equal justice under law and, thereby, also functions as guardian and interpreter of the Constitution."

On the right, a light-themed capture from August 4, 2017, shows a similar layout but with different content. It features a banner with the text "We the People" and "SUPREME COURT OF THE UNITED STATES". Below the banner, there are links for "Visiting the Court", "Touring the Buildings", and "Exhibitions". The "About the Supreme Court" section includes a photo of the Justices and links to "Current Members of the Supreme Court", "Circuit Assignments of Justices", "Members of the Supreme Court (1789 to Present)", "The Justices' Caseload", and "Frequently Asked Questions About Justices".

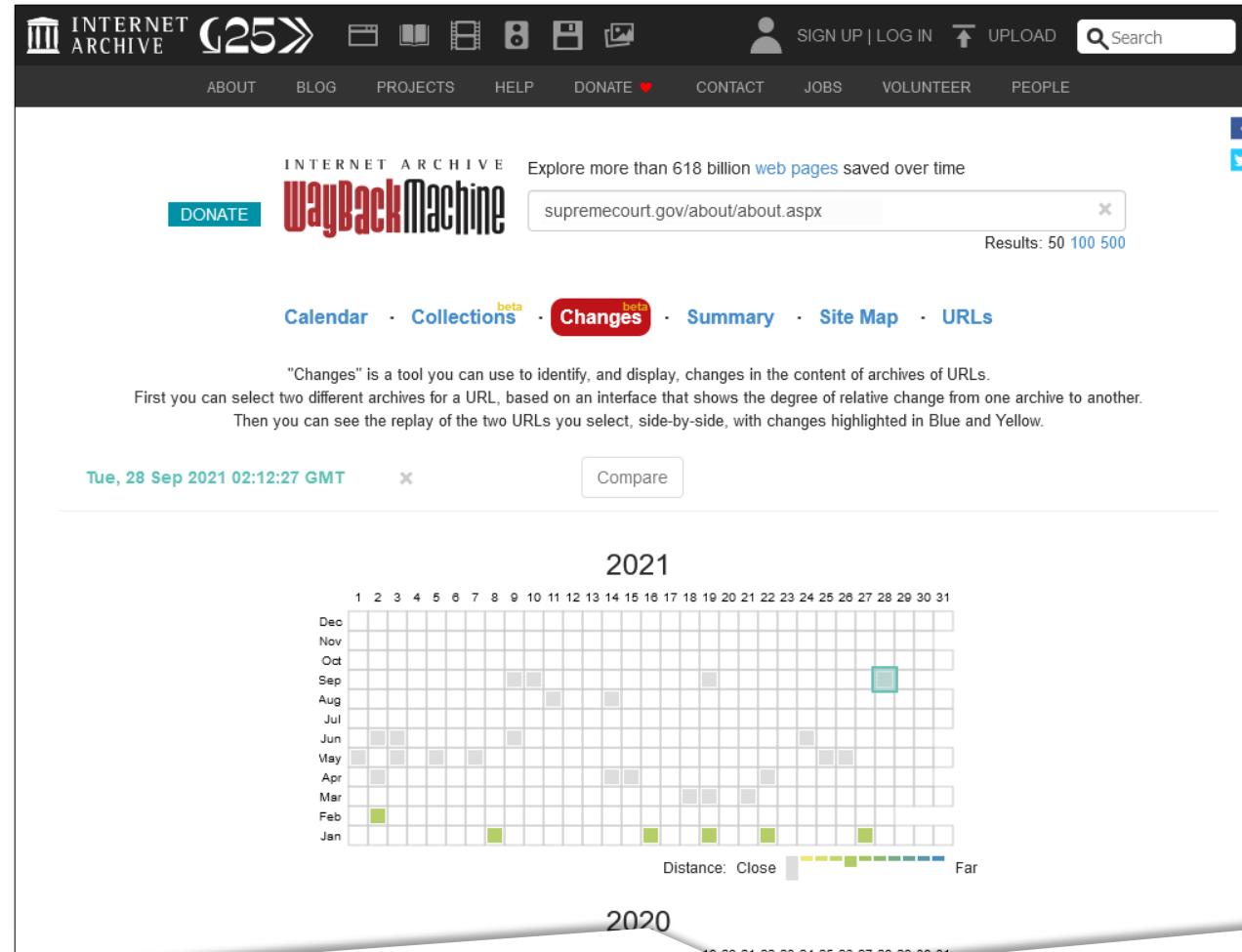
At the bottom of the interface, there is a footer with the text "Internet Archive: Wayback Machine".

Changes tool: comparing captures

- yellow highlighted text was deleted
- blue highlighted text was added
- note that the website design has changed significantly, but this isn't specifically detected by the Changes tool
- however, major text changes often accompany major website design changes

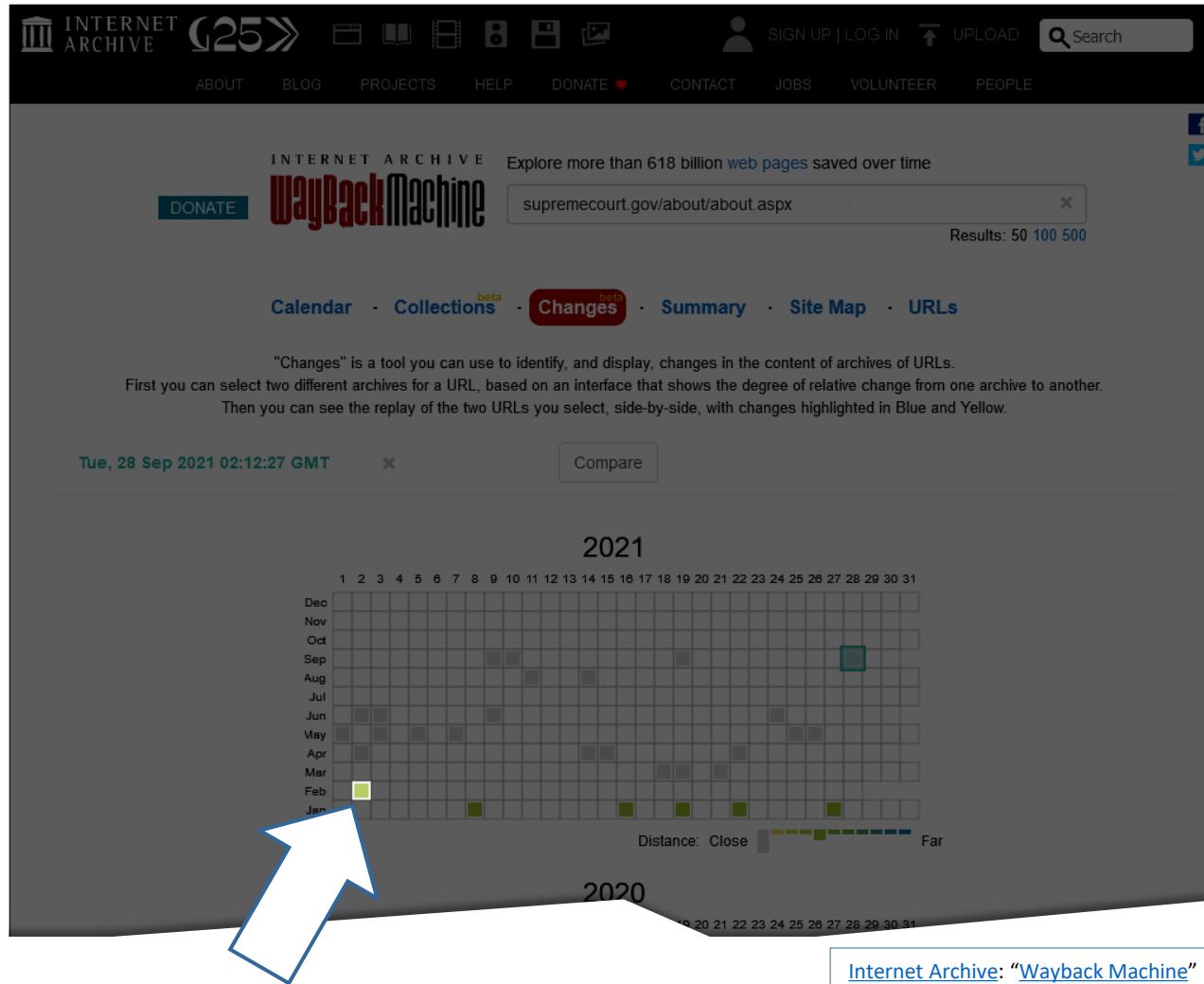


Changes tool: choose 28 September 2021 capture

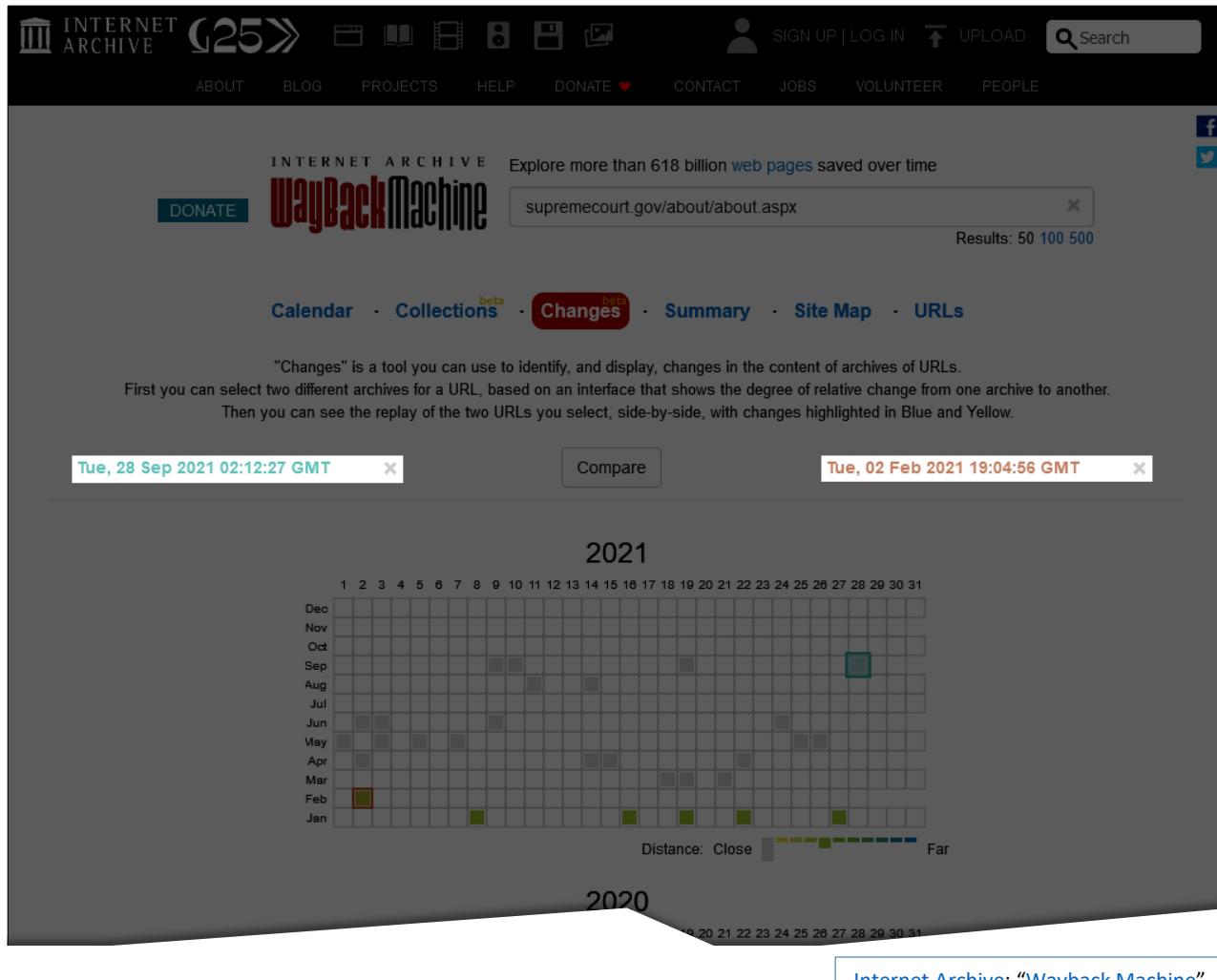


[Internet Archive: "Wayback Machine"](#)

Changes tool: compare w/ 2 February 2021 capture

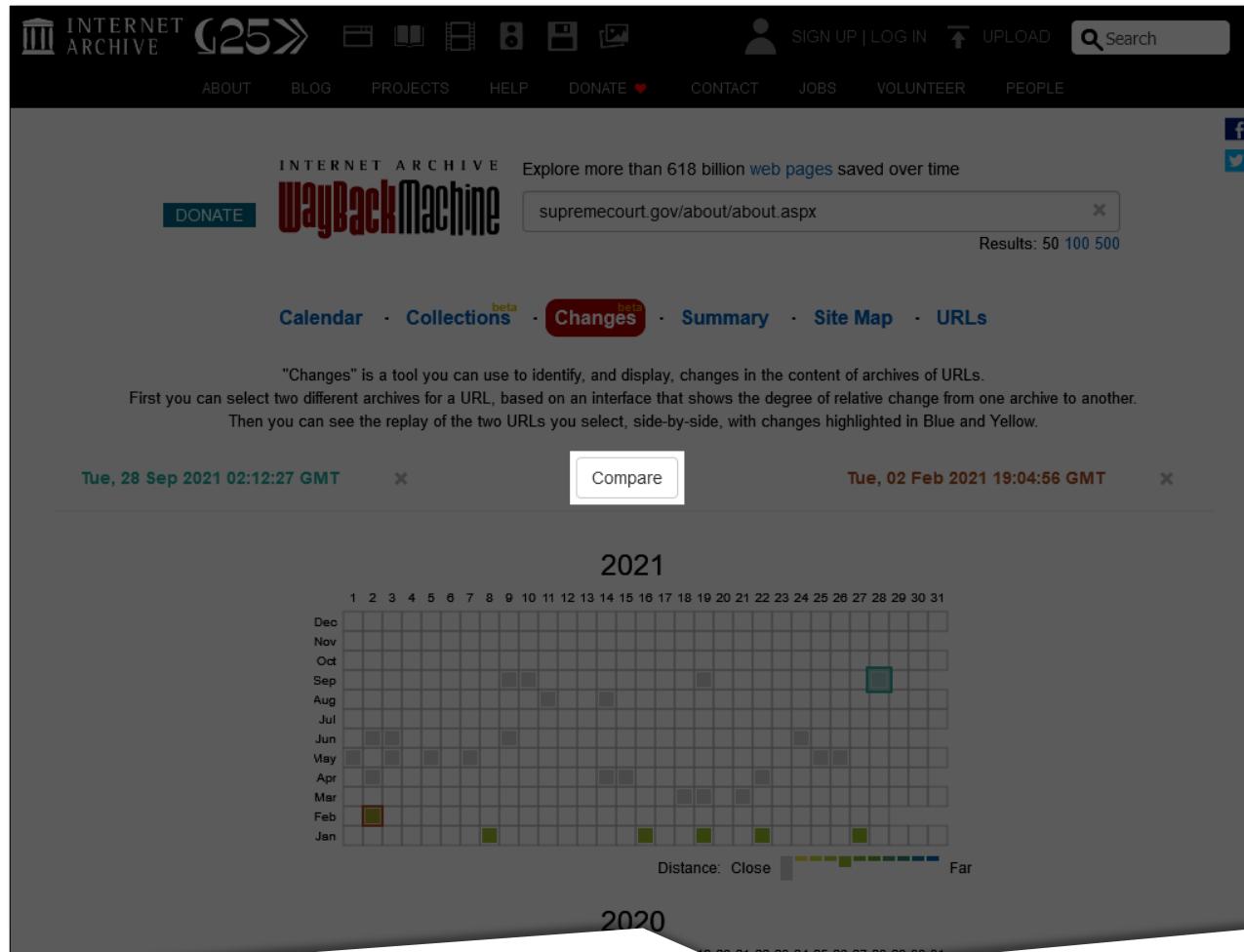


Changes tool: two captures selected



Internet Archive: "Wayback Machine"

Changes tool: click *Compare*



Internet Archive: "Wayback Machine"

Changes tool: compare 28 Sep. 2021 + 2 Feb. 2021 captures

The screenshot shows a comparison between two versions of the Supreme Court of the United States website. The left column represents the state as of September 28, 2021, and the right column represents the state as of February 2, 2021.

Left Column (September 28, 2021 capture):

- Chief Justice of the United States:** [link]
- Associate Justices:** [link]
- Retired Justices:** [link]
- Court Officers:**

Counselor to the Chief Justice	Jeffrey P. Minear
Clerk	Scott S. Harris
Librarian	Linda Maslow
Marshal	Gail Curley
Reporter Of Decisions	Rebecca A. Womeldorf
Court Counsel	Ethan V. Torrey
Curator	Catherine E. Fitts
Director Of Information Technology	Robert J. Hawkins
Public Information Officer	Patricia McCabe
- The Supreme Court of the United States:**

One First Street, NE, Washington, DC 20543
Phone: 202-479-3000
- OPINIONS:**
 - Opinions of the Court
 - Opinions Relating to Orders
 - In-Chambers Opinions
 - U.S. Reports

Right Column (February 2, 2021 capture):

- Chief Justice of the United States:** [link]
- Associate Justices:** [link]
- Retired Justices:** [link]
- Court Officers:**

Counselor to the Chief Justice	Jeffrey P. Minear
Clerk	Scott S. Harris
Librarian	Linda Maslow
Marshal	Vacant
Reporter Of Decisions	Vacant
Court Counsel	Ethan V. Torrey
Curator	Catherine E. Fitts
Director Of Information Technology	Robert J. Hawkins
Public Information Officer	Kathleen L. Arberg
- The Supreme Court of the United States:**

One First Street, NE, Washington, DC 20543
Phone: 202-479-3000
- OPINIONS:**
 - Opinions of the Court
 - Opinions Relating to Orders
 - In-Chambers Opinions
 - Volumes

Internet Archive: ["Wayback Machine"](#)



Authentication + Admissibility



[“Quality control”](#) by [Lars Plougmann](#) under [CC BY-SA 2.0](#)

authentication + admissibility overview

- IAWM cited in 300+ U.S. federal court cases
- harder to authenticate than other web content
- strategies include:
 - judicial notice
 - IA affidavit
 - witness w/ personal knowledge
 - expert witness
 - mutual stipulation



"Dollar" by [Images Money](#) under [CC BY 2.0](#)

judicial notice (FRE 201)

Wikipedia

- *Judicial notice is a rule in the law of evidence that allows a fact to be introduced into evidence if the truth of that fact is so notorious or well known, or so authoritatively attested, that it **cannot reasonably be doubted**... Facts and materials admitted under judicial notice are accepted without being formally introduced by a witness or other rule of evidence”*

[Wikipedia: “Judicial notice”](#)

FRE 201

Judicial Notice of Adjudicative Facts

- b. Kinds of Facts That May Be Judicially Noticed. The court may judicially notice a fact that is not subject to reasonable dispute because it:
 2. can be accurately and readily determined from sources whose accuracy cannot reasonably be questioned.

[Legal Information Institute: “Rule 201. Judicial Notice of Adjudicative Facts | Federal Rules of Evidence”](#)

authentication via judicial notice

- efficient but inconsistent + jurisdiction-sensitive
- vital to research a given court's disposition towards IAWM evidence
- judges may themselves introduce IAWM evidence
- more likely to prevail in absence of specific assertions of unreliability



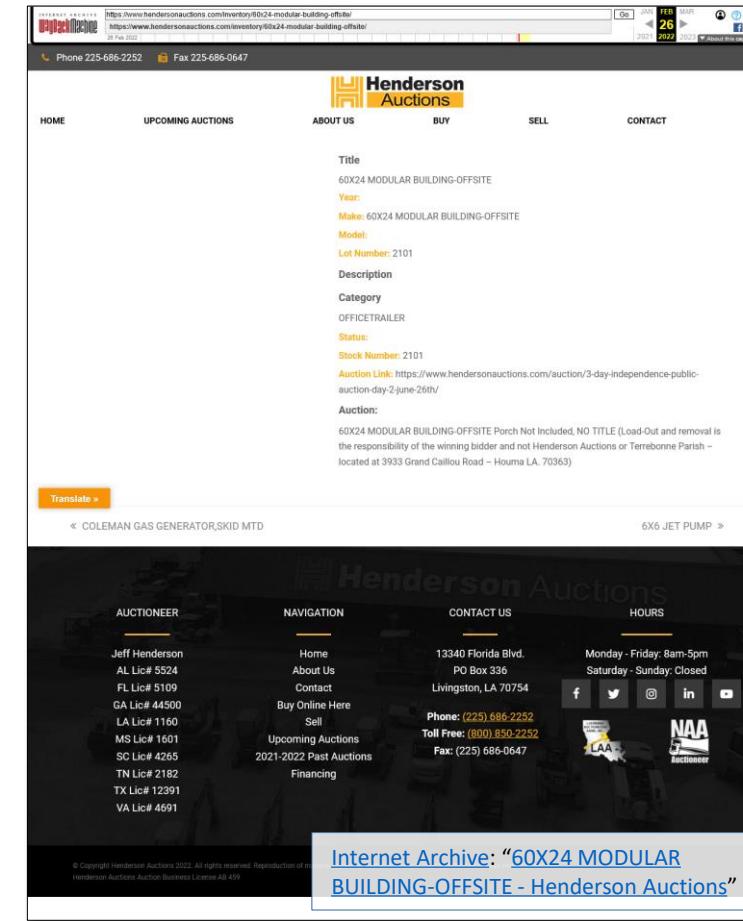
["Earthrise"](#) by [Bill Anders](#) under [Public Domain](#)

Weinhoffer v. Davie Shoring, Inc. (2022)

- IAWM used to show online auction terms of sale
- district court's admission of IAWM evidence via judicial notice reversed

"Here, there was no testimony to authenticate the archived webpage. Our sister circuits' decisions that the Wayback Machine is not self-authenticating are persuasive in the context of judicial notice. In sum, the district court erred in taking judicial notice of the terms because a private internet archive falls short of being a source whose accuracy cannot reasonably be questioned as required by Rule 201. "

[Weinhoffer v. Davie Shoring, Inc., No. 20-30568, at *7 \(5th Cir. Jan. 20, 2022\)](#)



Internet Archive: "[60X24 MODULAR BUILDING-OFFSITE - Henderson Auctions](#)"

authentication via IA affidavit

- reliable + efficient
- incorrect application explains most of its authentication failures
- works best for simple cases
- but less ideal when conclusions require interpretation



"Paperwork" by Damian Gadal under CC BY 2.0

IA affidavit guidance

Do I really need an affidavit from the Internet Archive?

No. Please consider alternatives to an affidavit from the Internet Archive. Judicial notice and stipulation to a document's authenticity are two typical and straightforward options that might be used instead of an affidavit. Since our resources are limited, we urge you to pursue these alternatives before coming to us with authentication requests.

Does the Internet Archive's affidavit mean that the printout was actually the page posted on the Web at the recorded time?

The Internet Archive's affidavit only affirms that the printed document is a true and correct copy of our records. It remains your burden to convince the finder of fact what pages were up when.

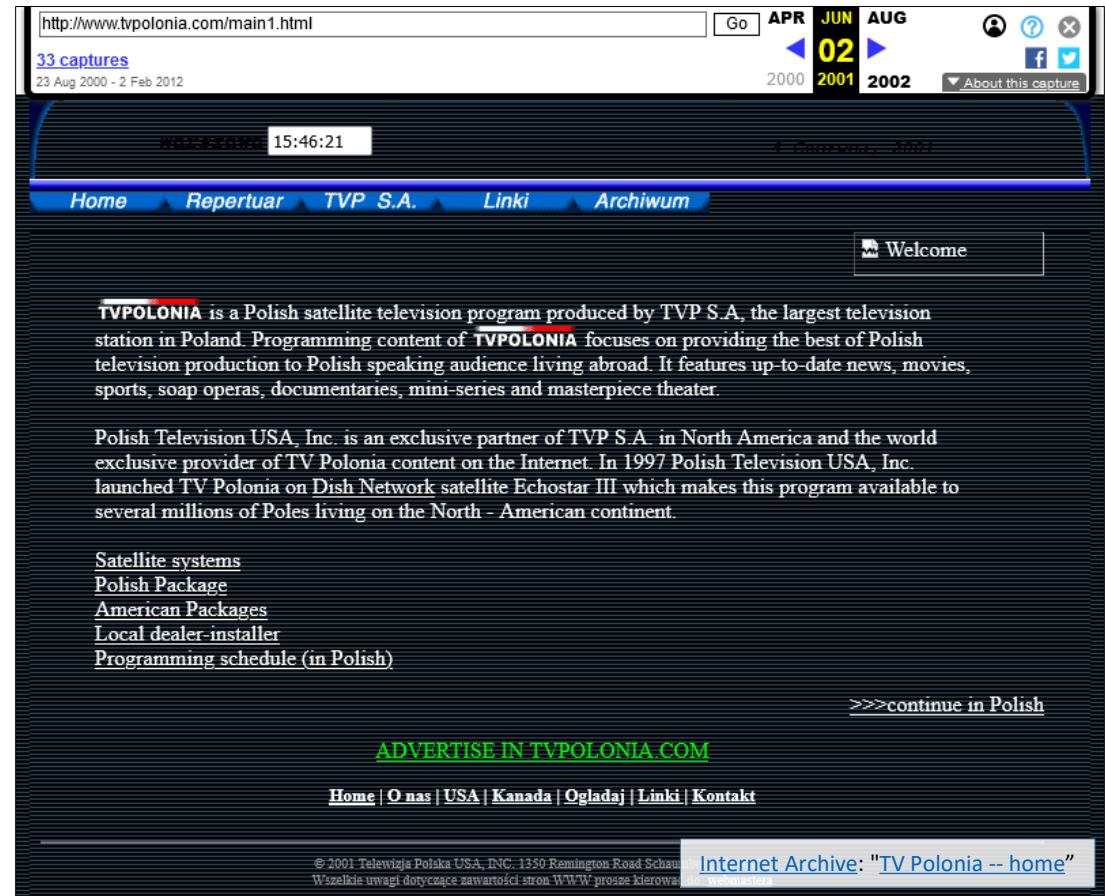
[Internet Archive: "Legal FAQ"](#)

Telewizja Polska USA, Inc. v. Echostar Satellite Corp. (2004)

- IAWM used to show advertisement of partner business service after contract expiration
- IAWM evidence admitted

“...Plaintiff has presented no evidence that the Internet Archive is unreliable or biased. And Plaintiff has neither denied that the exhibit represents the contents of its website on the dates in question, nor come forward with its own evidence challenging the veracity of the exhibit. Under these circumstances, the Court is of the opinion that [the IA affidavit] is sufficient to satisfy Rule 901's threshold requirement for admissibility. Plaintiff is free to raise its concerns regarding reliability with the jury.”

[Telewizja Polska USA, Inc. v. Echostar Satellite Corp., 02 C 3293, at *14 \(N.D. Ill., Jun. 3 2004\)](#)



witness w/ personal knowledge – FRE 901(b)(1)

Authenticating or Identifying Evidence

- b) Examples. The following are examples only – not a complete list – of evidence that satisfies the requirement:
 - 1) Testimony of a Witness with Knowledge. Testimony that an item is what it is claimed to be.

[Legal Information Institute: "Rule 901. Authenticating or Identifying Evidence | Federal Rules of Evidence"](#)

authentication via witness w/ personal knowledge

- more effective when leveraging witness w/ personal knowledge of historical web content
- less effective when instrumentally entering into record a comparison performed by a random person



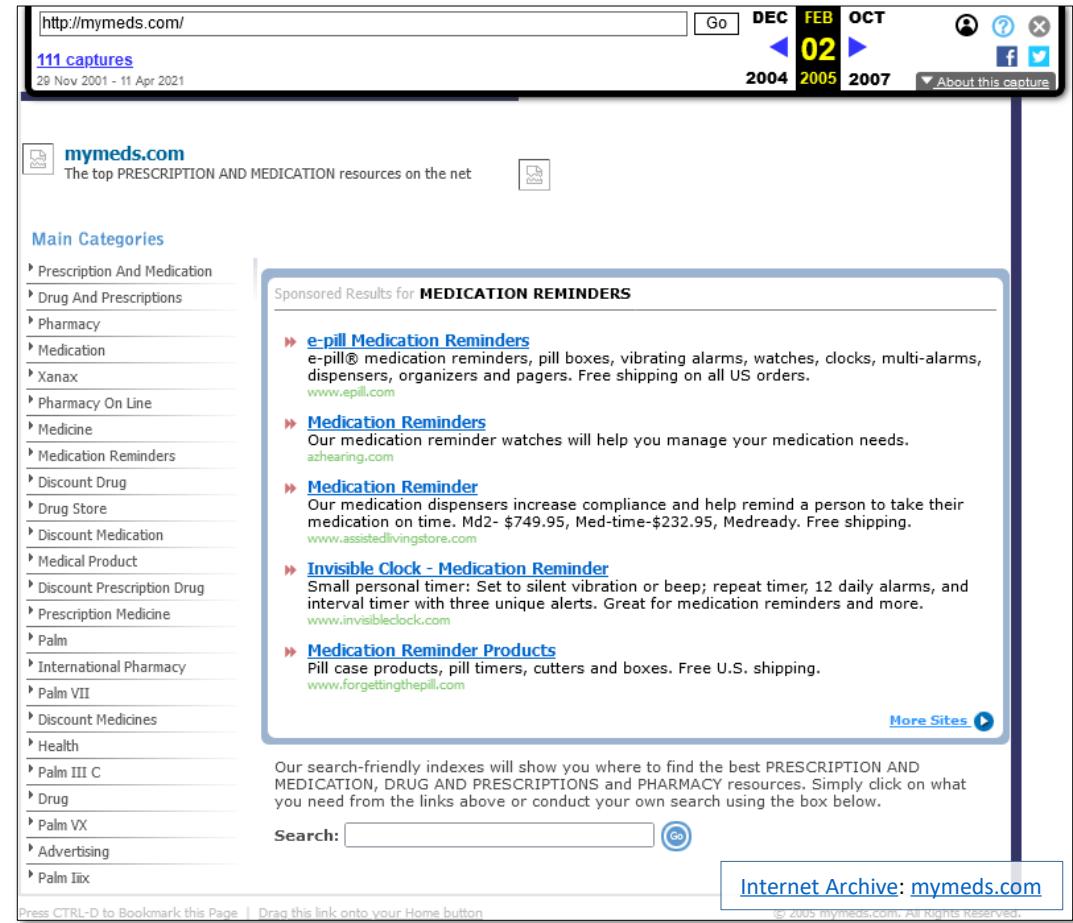
"One year + of journals" by [Pain Chaud](#) under CC BY-ND 2.0

United States v. Bansal (2011)

- IAWM used to show operation of an online pharmacy
- IAWM evidence admitted

"To authenticate that the screen-shot was what it purported to be, the government called a witness to testify about how the Wayback Machine website works and how reliable its contents are. The witness also compared the screenshots with previously authenticated and admitted images from Bansal's website and concluded, based upon her personal knowledge, that the screenshots were authentic. This was evidence 'sufficient to support a finding' that the screenshots were 'what they purport[ed] to be,' rendering them admissible under Rule 901(b)(1). Accordingly, we will affirm the District Court."

[United States v. Bansal, 663 F.3d 634, 652, at *667-668 \(3d Cir.2011\)](#)



expert witnesses – FRE 702

Testimony by Expert Witnesses

- a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
- b) the testimony is based on sufficient facts or data;
- c) the testimony is the product of reliable principles and methods; and
- d) the expert has reliably applied the principles and methods to the facts of the case.

[Legal Information Institute: "Rule 702. Testimony by Expert Witnesses | Federal Rules of Evidence"](#)

authentication via expert witness

- reliable but more involved + less-used mechanism
- use when interpretation, explanation, or qualification needed
- expert witnesses have included:
 - digital forensics specialists
 - patent examiners
 - web archiving professional(s)



"Test tubes and other recipients in chemistry lab" by Old Photo Profile under CC BY 2.0

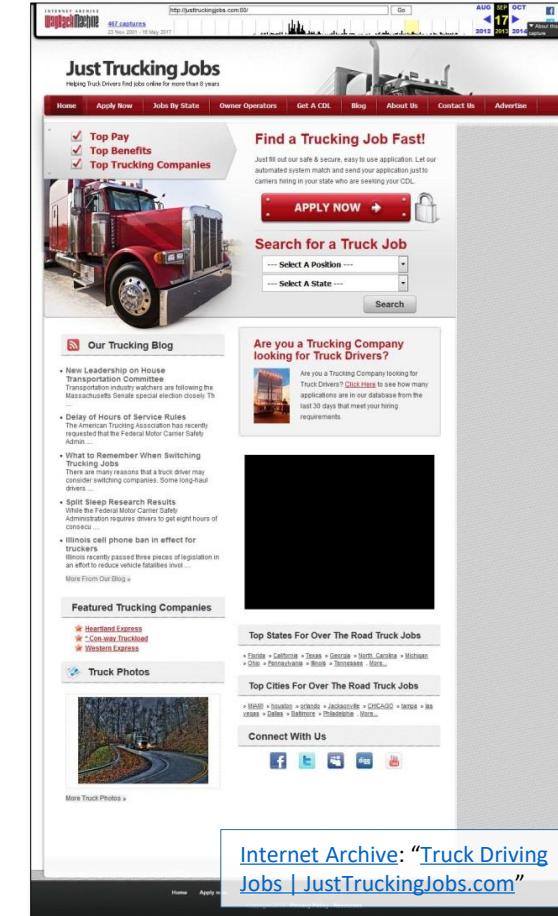
Marten Transport, Ltd. v. PlattForm Advertising, Inc. (2016)

- IAWM used to show ongoing use of mark over period of time
- IAWM evidence admitted

"PlattForm argues that Mr. Fischer, in opining that certain websites referenced Marten in the past as shown by the Wayback Machine, improperly acts as a surrogate for the experts who created the Internet Archive.

The Court rejects this challenge. PlattForm relies on Khoday v. Symantec Corp., 93 F.Supp.3d 1067 (D.Minn.2015), but in that case, the court rejected an argument that the expert was not qualified because he had not worked at the Internet Archive to design the Wayback Machine archives or the web crawler that it used...PlattForm notes that the expert in Khoday at least had experience creating web archives, but the court in that case did not suggest that such archiving experience was required...In this case, Mr. Fischer has experience using tools to recover electronic data, including the use of the Wayback Machine, and the Court finds such experience to be sufficient to withstand a Daubert challenge."

[Marten Transp., Ltd. v PlattForm Advertising, Inc.,
184 F. Supp. 3d 1006, at *1009 \(D. Kan. 2016\)](#)



Frye + Daubert standards

Frye standard

- established in *Frye v. United States, 293 F. 1013 (D.C. Cir. 1923)*
- “*...the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.*”

Daubert standard

- established in *Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993)*
- “*...the trial judge...must make a preliminary assessment of whether the testimony's underlying reasoning or methodology is scientifically valid and properly can be applied to the facts at issue.*”

[Legal Information Institute: “Frye Standard”](#)

[Legal Information Institute: “Daubert Standard”](#)

admissibility trends summary – U.S. federal courts

	judicial notice		IA standard affidavit		witness w/ personal knowledge		expert witness	
admitted?	yes	no	yes	no	yes	no	yes	no
U.S. district court	47	12	14	3	6	4	7	0
U.S. circuit court	1	2	2	0	3	1	2	0

- based on analysis of ~300 U.S. federal court cases mentioning IAWM
- affidavit + expert witness succeed most consistently
- examples of all strategies succeeding at circuit court level, but [recent ruling](#) will likely make judicial notice less successful going forward

Temporal (In)coherence

[“clock composition” by Lisa Ann Yount under CC0 1.0](#)



temporal (in)coherence

http://www.wunderground.com/cgi-bin/findweather/getForecast?query=50593

34 captures
27 Oct 2002 - 10 Jun 2017

Go AUG DEC MAR
09 2003 2004 2006

Find the Weather for any City, State or ZIP Code, or Airport
Code or Country

wunderground.com PDA/Mobile

Member Benefits:
No Ads
Weather Email
\$5 a year
Signup Here

Email taylorm@gmail.com
Password *****
Login
Print This Page

Features: Wunder Photos NEXRAD radar Regional Radar NEW Zoom Satellite Maps Trip Planner
Tropical / Hurricane Marine Severe Astronomy Ski Education Favorites Personal Weather Stations

Varina, Iowa

Local Time: 1:09 PM CST Set My Timezone

Lat/Lon: 42.6° N 94.8° W | MSN Map

Updated: 12:55 PM CST on December 09, 2004
Observed at Storm Lake, Iowa (History)
Elevation: 1486 ft / 453 m

Current Conditions
41 °F / 5 °C
Light Drizzle
Windchill: 37 °F / 3 °C
Humidity: 100%
Dew Point: 41 °F / 5 °C
Wind: 6 mph / 9 km/h from the South
Pressure: 29.56 in / 1001 hPa
Visibility: 5.0 miles / 8.0 kilometers
UV: 1 out of 12
Clouds: Overcast 6500 ft (AGL) / 1981 m
Show full METARS (help)

5-Day Forecast for ZIP Code 50593

Thu	Fri	Sat	Sun	Mon
43° 29°	36° 22°	47° 34°	41° 15°	31° 15°
Chance of Rain	Mostly Cloudy	Mostly Cloudy	Partly Cloudy	Partly Cloudy
Detail				

Click Detail for hourly wind, temperature, humidity and UV forecasts.
Alternate Computer Forecast: AVN MOS Weather Graph | Local Allergy Info from Pollen.com

Meet Locals
read their Hotel Tips and Travel Guides for Varina, IA

In Varina
Unbiased reviews and advice for Varina hotels and other cities

Wunder Photos

Show
•Varina or •Iowa

Now
Dense fog will persist along and west of Highway 169 through the early afternoon. Locations from Algona to Estherville can expect visibilities to remain around a quarter mile or less with localized areas in low lying spots under one eighth of a mile.

Forecast for Pocahontas County
Updated: 11:20 am CST on December 9, 2004
No Active Advisories (US Severe Weather)

This Afternoon
Cloudy with a chance of light rain showers. High in the lower 40s. West wind 10 to 15 mph. Chance of rain 30 percent.
[Detail](#)

Tonight
Light rain likely through the evening. Light snow likely after midnight. Little or no snow around 30. Northwest wind 15 to 20 mph. Chance of snow 30 percent.

Scott G. Ainsworth, et al.: "Only One Out of Five Archived Web Pages Existed as Presented"

Internet Archive: "Weather Underground: Varina, Iowa Forecast"

temporal (in)coherence

http://www.wunderground.com/cgi-bin/findweather/getForecast?query=50593

34 captures
27 Oct 2002 - 10 Jun 2017

INTERNET ARCHIVE
wayback machine

wunderground.com PDA/Mobile

Find the Weather for any City, State or ZIP Code, or Airport Code or Country

Features: Wunder Photos NEXRAD radar Regional Radar NEW Zoom Satellite Maps Trip Planner Tropical / Hurricane Marine Severe Astronomy Ski Education Favorites Personal Weather Stations

Varina, Iowa

Local Time: 1:09 PM CST Set My Timezone

Updated: 12:55 PM CST on December 09, 2004

Observed at Storm Lake, Iowa (History)

Elevation: 1486 ft / 453 m

Current Conditions

41 °F / 5 °C Light Drizzle Windchill: 37 °F / 3 °C

Humidity: 100% Dew Point: 41 °F / 5 °C Wind: 6 mph / 9 km/h from the South

Pressure: 29.56 in / 1001 hPa Local Satellite

Visibility: 5.0 miles / 8.0 kilometers Ski Conditions

UV: 1 out of 12 Clouds: Overcast 6500 ft (AGL): / 1981 m Show full METARS (help)

Local Radar Regional Radar Personal Weather Stations

Meet Locals read their Hotel Tips and Travel Guides for Varina, IA

Unbiased reviews and advice for Varina hotels and other cities

Wunder Photos

Now Dense fog will persist along and west of Highway 169 through the early afternoon. Locations from Alona to Estherville can expect visibilities to remain around a quarter mile or less with localized areas in low lying spots under one eighth of a mile.

Forecast for Pocahontas County

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No Active Advisories (US Severe Weather)

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Scott G. Ainsworth, et al.: "Only One Out of Five Archived Web Pages Existed as Presented"

Internet Archive: "Weather Underground: Varina, Iowa Forecast"

AUG DEC MAR
09
2003 2004 2006
About this capture

temporal (in)coherence: *About this capture*

The screenshot shows a weather forecast page from WeatherUnderground.com for Varina, Iowa, on December 9, 2004. The page includes a 5-day forecast, current conditions, and nearby city information. A large white arrow points to the top right corner of the page, where a link labeled "About this capture" is visible.

Member Benefits:
No Ads
Weather Email
\$5 a year
Signup Here

Email
taylorm@gmail.com
Password

Login

Print This Page

Maps

- Temperature
- Heat Index
- Windchill
- Humidity
- Radar
- Dew Point
- Wind
- Visibility
- Visible Satellite
- Satellite
- Fronts
- Snow Depth
- Jet Stream
- Flight Rules
- Health Maps
- UV Forecast
- Air Quality
- Peak Air Quality Index
- International
- United States
- Canada
- Mexico
- Central America
- South America
- Northern Asia

Features: Wunder Photos, NEXRAD radar, Regional Radar, NEW Zoom Satellite, Maps, Trip Planner

Tropical / Hurricane, Marine, Severe, Astronomy, Ski, Education, Favorites, Personal Weather Stations

Varina, Iowa
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Updated: 12:55 PM CST on December 09, 2004
Observed at Storm Lake, Iowa (History)
Elevation: 1486 ft / 453 m

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UV: 1 out of 12
Clouds: Overcast 6500 ft (AGL): / 1981 m
Show full METARS (help)

5-Day Forecast for ZIP Code 50593

Thu	Fri	Sat	Sun	Mon
43° 29°	36° 22°	47° 34°	41° 15°	31° 15°
Chance of Rain	Mostly Cloudy	Mostly Cloudy	Partly Cloudy	Partly Cloudy
Detail				

Click [Detail](#) for hourly wind, temperature, humidity and UV forecasts.
Alternate Computer Forecast: [AVN MOS Weather Graph](#) | [Local Allergy Info from Pollen.com](#)

Meet Locals
read their Hotel Tips and Travel Guides for Varina, IA

in Varina
Unbiased reviews and advice for Varina hotels and other cities

Wunder Photos

Show
Varina or Iowa

Now
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Forecast for Pocahontas County
Updated: 11:20 am CST on December 9, 2004
No Active Advisories ([US Severe Weather](#))

This Afternoon
Cloudy with a chance of light rain showers. High in the lower 40s. West wind 10 to 15 mph. Chance of rain 30 percent.
[Detail](#)

Tonight
Light rain likely through the evening. Light snow likely after midnight. Little or no snow around 30. Northwest wind 15 to 20 mph. Chance of snow 30 percent.

Conditions Nearby

City	Temp	Conditions	Updated
Storm Lake	41 °F / 5 °C	Light Drizzle	12:55 PM CST
Fort Dodge	41 °F / 5 °C	Partly	12:55 PM CST

Scott G. Ainsworth, et al.: "Only One Out of Five Archived Web Pages Existed as Presented"

Internet Archive: "Weather Underground: Varina, Iowa Forecast"

temporal (in)coherence: *About this capture*

INTERNET ARCHIVE
wayback machine

http://www.wunderground.com/cgi-bin/findweather/getForecast?query=50593 Go AUG DEC MAR
34 captures 09 2003 2004 2006 About this capture

27 Oct 2002 - 10 Jun 2017

COLLECTED BY Alexa Web Inform Collection: Alexa Crawls EA
Starting in 1996, Alexa Internet has been donating their crawl data to the Internet Archive. Flowing in every day, these data are added to the Wayback Machine after an embargo period.

Features: Wunder Photos RECORD radar Regional Radar Radar Satellite Maps Trip Planner

TIMESTAMPS

http://icons.wunderground.com/data/wximagenew/a/abby/29-banner.jpg +9 years 5 months
http://icons.wunderground.com/data/wximagenew/d/d70dave0-thumb.jpg +9 years 18 days
http://banners.wunderground.com/cgi-bin/statefarmbanner?ip=50593&width=150 +1 year 3 months
http://www.wunderground.com/data/nids/DMX19_thumb_t.jpg +9 months 7 days
http://icons.wunderground.com/graphics/smash/blue/localRadar.gif -20 days 1 minute
http://icons.wunderground.com/graphics/smash/blue/weatherStation.gif -20 days 52 seconds
http://icons.wunderground.com/graphics/highleft.gif -20 days 48 seconds
http://icons.wunderground.com/graphics/smash/blue_noWarning.gif -20 days 43 seconds
http://icons.wunderground.com/graphics/smashed_satellite.gif -20 days 38 seconds
http://icons.wunderground.com/graphics/highright.gif -20 days 37 seconds
http://icons.wunderground.com/graphics/lowleft.gif -20 days 18 seconds
http://icons.wunderground.com/graphics/smash/blue/add3.gif -20 days 16 seconds
http://icons.wunderground.com/graphics/smash/blue/ski.gif -20 days 13 seconds
http://icons.wunderground.com/graphics/smash/blue/envelope2.gif -20 days 11 seconds
http://icons.wunderground.com/graphics/smash/blue/tripPlanner.gif -20 days 4 seconds
http://icons.wunderground.com/graphics/lowright.gif -20 days 2 seconds
http://icons.wunderground.com/graphics/smash/blue_radar.gif -19 days 23 hours

Add this page to your Favorites Weather Email Lat/Lon: 42.6° N 94.8° W | MSN Meteo

5-Day Forecast for ZIP Code 50593

Thu	Fri	Sat	Sun	Mon
43° 29° Chance of Rain	36° 22° Mostly Cloudy	47° 34° Mostly Cloudy	41° 15° Partly Cloudy	31° 15° Partly Cloudy

Click Detail for hourly wind, temperature, humidity and UV forecasts.

Heat Index Windchill: 37 °F / 3 °C
Humidity: 100%
Dew Point: 41 °F / 5 °C
Wind: 6 mph / 9 km/h from the South
Pressure: 29.56 in / 1001 hPa
Visibility: 5.0 miles / 8.0 kilometers
UV: 1 out of 12
Clouds: Overcast 6500 ft (AGL): / 1981 m
Show full METARS (help)

Windchill: 37 °F / 3 °C
Humidity: 100%
Dew Point: 41 °F / 5 °C
Wind: 6 mph / 9 km/h from the South
Pressure: 29.56 in / 1001 hPa
Visibility: 5.0 miles / 8.0 kilometers
UV: 1 out of 12
Clouds: Overcast 6500 ft (AGL): / 1981 m
Show full METARS (help)

Alternate Computer Forecast: AVN MOS Weather Graph | Local Allergy Info from Pollen.com

Meet Locals
read their Hotel Tips and Travel Guides for Varina, IA

In Varina
Unbiased reviews and advice for Varina hotels and other cities

Best Rates GUARANTEED Discount Hotels

Wunder Photos

Show Varina or Iowa

Now
Dense fog will persist along and west of Highway 169 through the early afternoon. Locations from Algona to Estherville can expect visibilities to remain around a quarter mile or less with localized areas in low lying spots under one eighth of a mile.

Forecast for Pocahontas County

Updated: 11:20 am CST on December 9, 2004
No Active Advisories (US Severe Weather)

This Afternoon
Cloudy with a chance of light rain showers. High in the lower 40s. West wind 10 to 15 mph. Chance of rain 30 percent.
Detail

Tonight
Light rain likely through the evening. Light snow likely after midnight. Little or no snow around 30. Northwest wind 15 to 20 mph. Chance of snow 60 percent.

Scott G. Ainsworth, et al.: "Only One Out of Five Archived Web Pages Existed as Presented"

Internet Archive: "Weather Underground: Varina, Iowa Forecast"

temporal (in)coherence: *About this capture*

The screenshot shows a Wayback Machine interface with the URL <http://www.wunderground.com/cgi-bin/findweather/getForecast?query=50593>. The timestamp is set to Dec 09, 2004. The page displays weather information for Varina, Iowa, including a 5-day forecast, local radar, and satellite imagery. A sidebar on the left lists various weather-related links such as Heat Index, Windchill, Humidity, Radar, Dew Point, Wind, Visibility, Satellite, and Flight Rules. A banner at the bottom encourages users to "Talk to State Farm agents near you!"

Organization: Alexa Crawls
Starting in 1996, Alexa Internet has been donating their crawl data to the Internet Archive. Flowing in every day, these data are added to the Wayback Machine after an embargo period.

Collection: Alexa Crawls EA
Crawl data donated by Alexa Internet. This data is currently not publicly accessible

Features: Wunder Photos, NextRADar, Regional Radar, NextSatellite, Maps, Trip Planner

TIMESTAMPS

http://icons.wunderground.com/data/wximagerew/a/abby/29-banner.jpg +9 years 5 months
http://icons.wunderground.com/data/wximagerew/d/d70dave0-thumb.jpg +9 years 18 days
http://banners.wunderground.com/cgi-bin/statefarmbanner?zip=50593&width=150 +1 year 3 months
http://www.wunderground.com/data/nids/DMX19_thumb_t.jpg +9 months 7 days
http://icons.wunderground.com/graphics/smash/blue/localRadar.gif -20 days 1 minute
http://icons.wunderground.com/graphics/smash/blue/weatherStation.gif -20 days 52 seconds
http://icons.wunderground.com/graphics/highlightr.gif -20 days 48 seconds
http://icons.wunderground.com/graphics/smash/blue/noWarning.gif -20 days 43 seconds
http://icons.wunderground.com/graphics/smash/red/satellite.gif -20 days 38 seconds
http://icons.wunderground.com/graphics/highlightr.gif -20 days 37 seconds
http://icons.wunderground.com/graphics/lowlightr.gif -20 days 18 seconds
http://icons.wunderground.com/graphics/smash/blue/add3off -20 days 16 seconds
http://icons.wunderground.com/graphics/smash/blue/ski.gif -20 days 13 seconds
http://icons.wunderground.com/graphics/smash/blue/envelope2.gif -20 days 11 seconds
http://icons.wunderground.com/graphics/smash/blue/tripPlanner.gif -20 days 4 seconds
http://icons.wunderground.com/graphics/lowlightr.gif -20 days 2 seconds
http://icons.wunderground.com/graphics/smash/blue/radar.gif -19 days 23 hours

5-Day Forecast for ZIP Code 50593

Thu	Fri	Sat	Sun	Mon
43° 29° Chance of Rain	36° 22° Mostly Cloudy	47° 34° Mostly Cloudy	41° 15° Partly Cloudy	31° 15° Partly Cloudy
Detail	Detail	Detail	Detail	Detail

Click Detail for hourly wind, temperature, humidity and UV forecasts.

Alternate Computer Forecast: AVN MOS Weather Graph | Local Allergy Info from Pollen.com

Meet Locals
read their Hotel Tips and Travel Guides for Varina, IA

In Varina
Unbiased reviews and advice for Varina hotels and other cities

Wunder Photos
Show Varina or Iowa

Now
Dense fog will persist along and west of Highway 169 through the early afternoon. Locations from Algona to Estherville can expect visibilities to remain around a quarter mile or less with localized areas in low lying spots under one eighth of a mile.

Forecast for Pocahontas County

Updated: 11:20 am CST on December 9, 2004
No Active Advisories ([US Severe Weather](#))

This Afternoon
Cloudy with a chance of light rain showers. High in the lower 40s. West wind 10 to 15 mph. Chance of rain 30 percent.
[Detail](#)

Tonight
Light rain likely through the evening. Light snow likely after midnight. Little or no snow around 30. Northwest wind 15 to 20 mph. Chance of snow 30 percent.

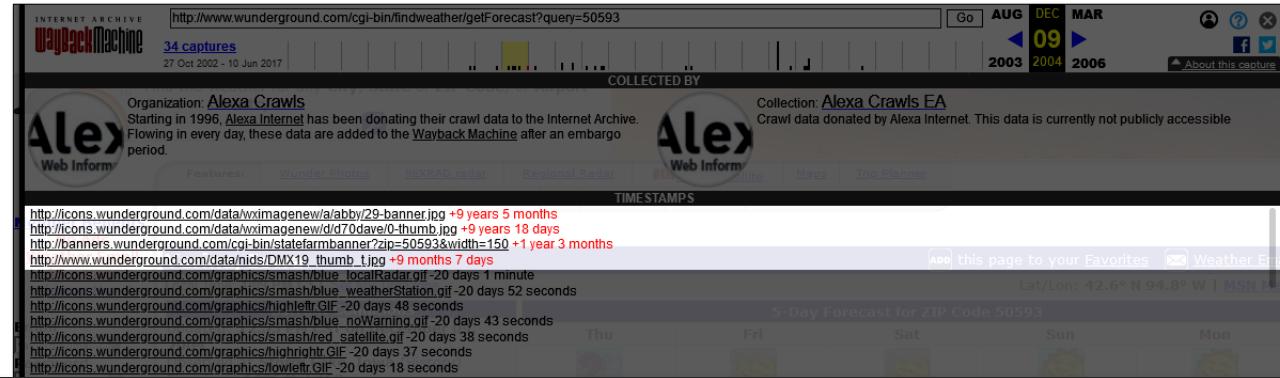
Conditions Nearby

City	Temp	Conditions	Updated
Storm Lake	41 °F / 5 °C	Light Drizzle	12:55 PM CST
Fort Dodge	41 °F / 5 °C	Partly	12:55 PM CST

Scott G. Ainsworth, et al.: "Only One Out of Five Archived Web Pages Existed as Presented"

Internet Archive: "Weather Underground: Varina, Iowa Forecast"

temporal (in)coherence: *About this capture*



[http://icons.wunderground.com/data/wximagenew/a/abby/29-banner.jpg +9 years 5 months](http://icons.wunderground.com/data/wximagenew/a/abby/29-banner.jpg)
[http://icons.wunderground.com/data/wximagenew/d/d70dave/0-thumb.jpg +9 years 18 days](http://icons.wunderground.com/data/wximagenew/d/d70dave/0-thumb.jpg)
[http://banners.wunderground.com/cgi-bin/statefarmbanner?zip=50593&width=150 +1 year 3 months](http://banners.wunderground.com/cgi-bin/statefarmbanner?zip=50593&width=150)
[http://www.wunderground.com/data/nids/DMX19_thumb_t.jpg +9 months 7 days](http://www.wunderground.com/data/nids/DMX19_thumb_t.jpg)

The screenshot shows the Weather Underground website for Varina, Iowa. It includes a 5-day forecast for ZIP Code 50593 and a "Conditions Nearby" section. The "Conditions Nearby" table lists the following data:

City	Temp	Conditions	Updated
Storm Lake	41 °F / 5 °C	Light Drizzle	12:55 PM CST
Fort Dodge	41 °F / 5 °C	Partly	12:55 PM CST

Scott G. Ainsworth, et al.: "Only One Out of Five Archived Web Pages Existed as Presented"

Internet Archive: "Weather Underground: Varina, Iowa Forecast"

temporal (in)coherence

http://www.wunderground.com/cgi-bin/findweather/getForecast?query=50593

34 captures
27 Oct 2002 - 10 Jun 2017

INTERNET ARCHIVE
wayback machine

wunderground.com PDA/Mobile

Find the Weather for any City, State or ZIP Code, or Airport Code or Country

Features: Wunder Photos NEXRAD radar Regional Radar NEW Zoom Satellite Maps Trip Planner Tropical / Hurricane Marine Severe Astronomy Ski Education Favorites Personal Weather Stations

Varina, Iowa

Local Time: 1:09 PM CST Set My Timezone

Updated: 12:55 PM CST on December 09, 2004

Observed at Storm Lake, Iowa (History)

Elevation: 1486 ft / 453 m

Current Conditions

41 °F / 5 °C Light Drizzle Windchill: 37 °F / 3 °C Humidity: 100% Dew Point: 41 °F / 5 °C Wind: 6 mph / 9 km/h from the South Pressure: 29.56 in / 1001 hPa Visibility: 5.0 miles / 8.0 kilometers UV: 1 out of 12 Clouds: Overcast 6500 ft (AGL): / 1981 m Show full METARS (help)

Windchill: 37 °F / 3 °C Humidity: 100% Dew Point: 41 °F / 5 °C Wind: 6 mph / 9 km/h from the South Pressure: 29.56 in / 1001 hPa Visibility: 5.0 miles / 8.0 kilometers UV: 1 out of 12 Clouds: Overcast 6500 ft (AGL): / 1981 m Show full METARS (help)

Local Radar Regional Radar Local Satellite Ski Conditions Trip Planner

Meet Locals read their Hotel Tips and Travel Guides for Varina, IA Unbiased reviews and advice for Varina hotels and other cities

in Varina Best Rates GUARANTEED Discount Hotels

Show Varina or Iowa

Now Dense fog will persist along and west of Highway 169 through the early afternoon. Locations from Alona to Estherville can expect visibilities to remain around a quarter mile or less with localized areas in low lying spots under one eighth of a mile.

Forecast for Pocahontas County

Updated: 11:20 am CST on December 9, 2004

No Active Advisories (US Severe Weather)

This Afternoon Cloudy with a chance of light rain showers. High in the lower 40s. West wind 10 to 15 mph. Chance of rain 30 percent.

Tonight Light rain likely through the evening. Light snow likely after midnight. Little or no snow around 30. Northwest wind 15 to 20 mph. Chance of snow 50 percent.

Conditions Nearby

City	Temp	Conditions	Updated
Storm Lake	41 °F / 5 °C	Light Drizzle	12:55 PM CST
Fort Dodge	41 °F / 5 °C	Partly	12:55 PM CST

STATE FARM Talk to State Farm agents near you: INSURANCE

Scott G. Ainsworth, et al.: "Only One Out of Five Archived Web Pages Existed as Presented"

Internet Archive: "Weather Underground: Varina, Iowa Forecast"

AUG DEC MAR
09
2003 2004 2006

temporal (in)coherence

http://www.wunderground.com/cgi-bin/findweather/getForecast?query=50593

34 captures
27 Oct 2002 - 10 Jun 2017

INTERNET ARCHIVE
wayback machine

Find the Weather for any City, State or ZIP Code, or Airport Code or Country

Features: Wunder Photos NEXRAD radar Regional Radar NEW Zoom Satellite Maps Tropical / Hurricane Marine Severe Astronomy Ski Education Favorites Personal Weather Stations

Member Benefits:
No Ads Weather Email \$5 a year Signup Here

Email taylorm@gmail.com Password ***** Login Print This Page

Varina, Iowa

Local Time: 1:09 PM CST Set My Timezone

Current Conditions

Updated: 12:55 PM CST on December 09, 2004
Observed at Storm Lake, Iowa (History)
Elevation: 1486 ft / 453 m

41 °F / 5 °C Light Drizzle Windchill: 37 °F / 3 °C
Humidity: 100% Dew Point: 41 °F / 5 °C Wind: 6 mph / 9 km/h from the South
Pressure: 29.56 in / 1001 hPa Visibility: 5.0 miles / 8.0 kilometers UV: 1 out of 12 Clouds: Overcast 6500 ft (AGL): / 1981 m Show full METARS (help)

Local Radar Regional Radar Local Satellite Ski Conditions Trip Planner Personal Weather Stations

Wunder Photos

5-Day Forecast for ZIP Code 50593

Thu Fri Sat Sun Mon

43° | 29° 36° | 22° 47° | 34° 41° | 15° 31° | 15°
Chance of Rain Mostly Cloudy Mostly Cloudy Partly Cloudy Partly Cloudy

Detail Detail Detail Detail Detail

Add this page to your Favorites Weather Email Lat/Lon: 42.6° N 94.8° W | MSN Map

Click Detail for hourly wind, temperature, humidity and UV forecasts.
Alternate Computer Forecast: AVN MOS Weather Graph | Local Allergy Info from Pollen.com

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Detail

Tonight Light rain likely through the evening. Light snow likely after midnight. Little or no snow around 30. Northwest wind 15 to 20 mph. Chance of snow

Scott G. Ainsworth, et al.: "Only One Out of Five Archived Web Pages Existed as Presented"

Internet Archive: "Weather Underground: Varina, Iowa Forecast"

temporal (in)coherence

http://www.wunderground.com/cgi-bin/findweather/getForecast?query=50593

34 captures
27 Oct 2002 - 10 Jun 2017

INTERNET ARCHIVE
wayback machine

Find the Weather for any City, State or ZIP Code, or Airport Code or Country

Features: Wunder Photos NEXRAD radar Regional Radar NEW Zoom Satellite Maps Tropical / Hurricane Marine Severe Astronomy Ski Education Favorites Personal Weather Stations

Member Benefits:
No Ads Weather Email \$5 a year Signup Here

Email taylorm@gmail.com Password ***** Login Print This Page

Varina, Iowa

Local Time: 1:09 PM CST Set My Timezone

Current Conditions

Updated: 12:55 PM CST on December 09, 2004
Observed at Storm Lake, Iowa (History)
Elevation: 1486 ft / 453 m

41 °F / 5 °C Light Drizzle Windchill: 37 °F / 3 °C

Humidity: 100% Dew Point: 41 °F / 5 °C Wind: 6 mph / 9 km/h from the South

Pressure: 29.56 in / 1001 hPa Local Satellite Visibility: 5.0 miles / 8.0 kilometers

UV: 1 out of 12 Clouds: Overcast 6500 ft (AGL): / 1981 m Show full METARS (help)

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Scott G. Ainsworth, et al.: "Only One Out of Five Archived Web Pages Existed as Presented"

Internet Archive: "Weather Underground: Varina, Iowa Forecast"

Webpage was captured on 9 December 2004 at 1:09p CST.

Timestamp in text on webpage corroborates time of capture (i.e., 9 December 2004 at 1:09p CST).

AUG DEC MAR
09 2004 2006
2003 2004 2006
About this capture

temporal (in)coherence

Text on webpage and associated infographic indicate current conditions as raining. Infographic captured on **12 December 2004 at 8:54a CST.**

Timestamp in text on webpage corroborates time of capture (i.e., **9 December 2004 at 1:09p CST**).

Webpage was captured on **9 December 2004 at 1:09p CST.**

Scott G. Ainsworth, et al.: "Only One Out of Five Archived Web Pages Existed as Presented"

Internet Archive: "Weather Underground: Varina, Iowa Forecast"

The screenshot shows the Weather Underground homepage for Varina, Iowa. At the top, there's a navigation bar with links for 'Features', 'Wunder Photos', 'NEXRAD radar', 'Regional Radar', 'Zoom Satellite', 'Maps', 'Tropical / Hurricane', 'Marine', 'Severe', 'Astronomy', 'Ski', 'Education', 'Favorites', and 'Personal Weather Stations'. Below the navigation is a search bar with the placeholder 'Find the Weather for any City, State or ZIP Code, or Airport Code or Country' and a magnifying glass icon. To the left, there's a sidebar with 'Member Benefits' like 'No Ads', 'Weather Email', '\$5 a year', and a 'Signup Here' button. The main content area has a dark header 'Varina, Iowa' with a blue background. It displays 'Local Time: 1:09 PM CST Set My Timezone' and 'Updated: 12:55 PM CST on December 09, 2004'. Below this, it says 'Observed at Storm Lake, Iowa (History)' and 'Elevation: 1486 ft / 453 m'. It shows a weather icon for '41 °F / 5 °C' and 'Light Drizzle', along with a small map of the area. To the right, there's a 5-day forecast table for December 9-13, 2004, showing temperatures and weather conditions for each day. Below the forecast is a section titled 'Now' with a weather icon and a text description: 'Dense fog will persist along and west of Highway 169 through the early afternoon. Locations from Algonia to Estherville can expect visibilities to remain around a quarter mile or less with localized areas in low lying spots under one eighth of a mile.' At the bottom, there's a 'Conditions Nearby' table with data for Storm Lake, Fort Dodge, and Dodge. The entire page is framed by a light gray border, and a large callout box highlights the timestamp in the text area on the right side of the page.

temporal (in)coherence

Text on webpage and associated infographic indicate current conditions as raining. Infographic captured on **12 December 2004 at 8:54a CST.**

Timestamp in text on webpage corroborates time of capture (i.e., **9 December 2004 at 1:09p CST.**)

Radar graphic reflects weather conditions (clear) at the time of its capture: **12 September 2005 at 5:34p CDT.**

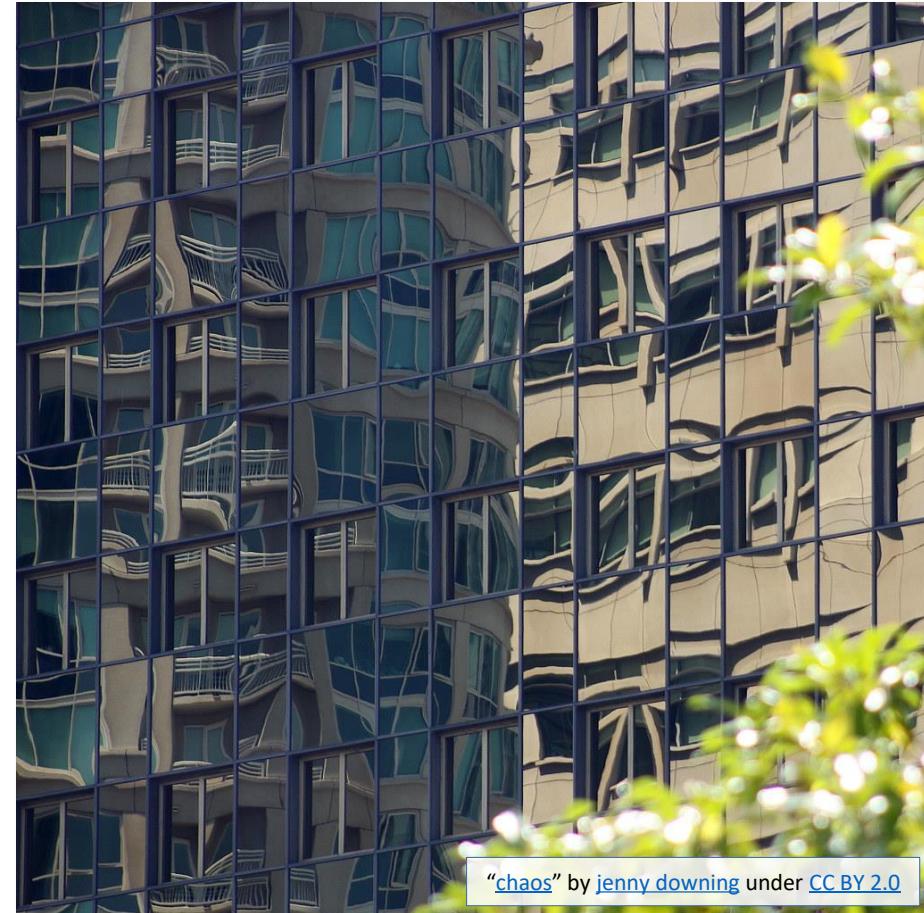
Scott G. Ainsworth, et al.: "Only One Out of Five Archived Web Pages Existed as Presented"

Internet Archive: "Weather Underground: Varina, Iowa Forecast"

The screenshot shows a historical web capture of the Weather Underground website for Varina, Iowa. The page displays current conditions (41°F / 5°C, Light Drizzle) and a five-day forecast for December 9-13, 2004. It also includes a radar map and a link to a September 12, 2005, forecast for Pocahontas County, which is noted as being clear. The timestamp on the webpage matches the capture date, demonstrating temporal coherence.

what's going on here?

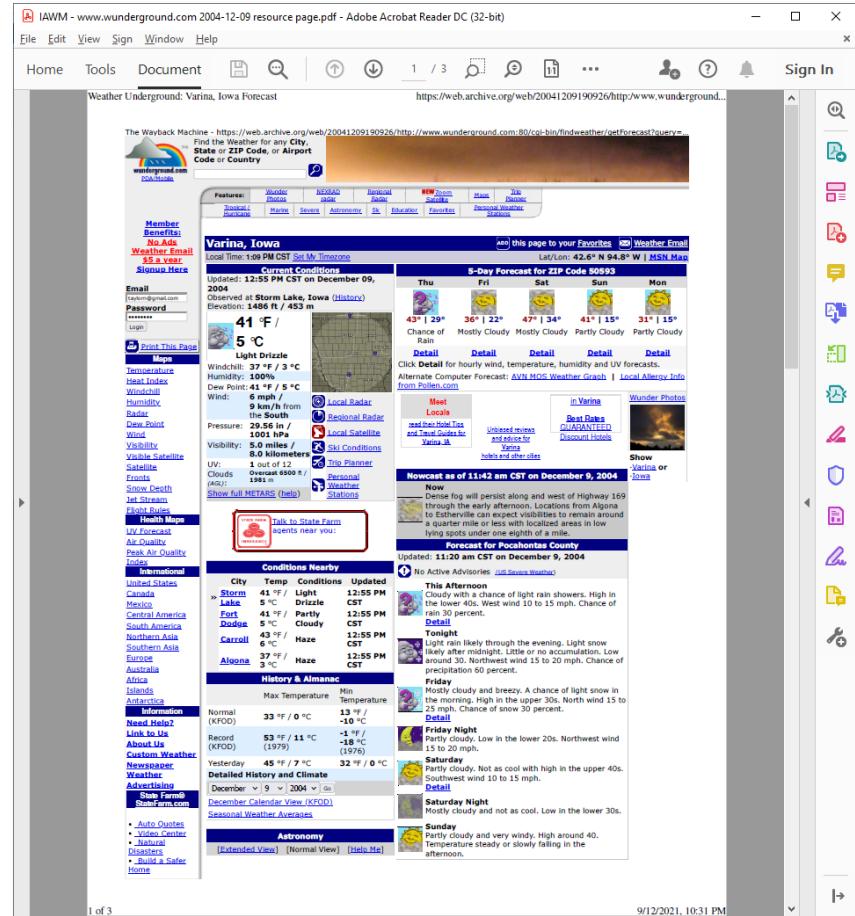
- archiving of web resources is time-staggered
- IAWM reconstitutes archived webpage w/ most temporally proximate elements
- IAWM may therefore re-present fictitious web pages
- examine capture dates + assess materiality of temporal incoherence



"chaos" by jenny downing under CC BY 2.0

problems w/ PDF

- IAWM evidence submitted as PDF screenshots
- temporal variations no longer apparent
- if temporal coherence is an issue, provide supplementary info



how to have admitted

- IA will still provide an affidavit
- however, this IAWM evidence is more easily contested
- or viewed as less credible by judge
- consider an expert witness



"Door Ajar" by Jenn Turner under CC BY 2.0



Timestamping Content Changes



"Annual_rings" by [Lige Eglite](#) under CC BY 2.0

sources of temporal information

conspicuous

- (system-generated) datetime string in webpage text
- IAWM capture timestamp

less obvious

- (system-generated) datetime string in webpage source code
- Google [before: operator](#)
- Twitter [until: operator](#)
- IAWM capture datetime of webpage w/ inlinks
- web server ⇄ client network headers (e.g., X-Archive-Orig-last-modified)
- timestamps in embedded image metadata (e.g., [Exif](#), [XMP](#))

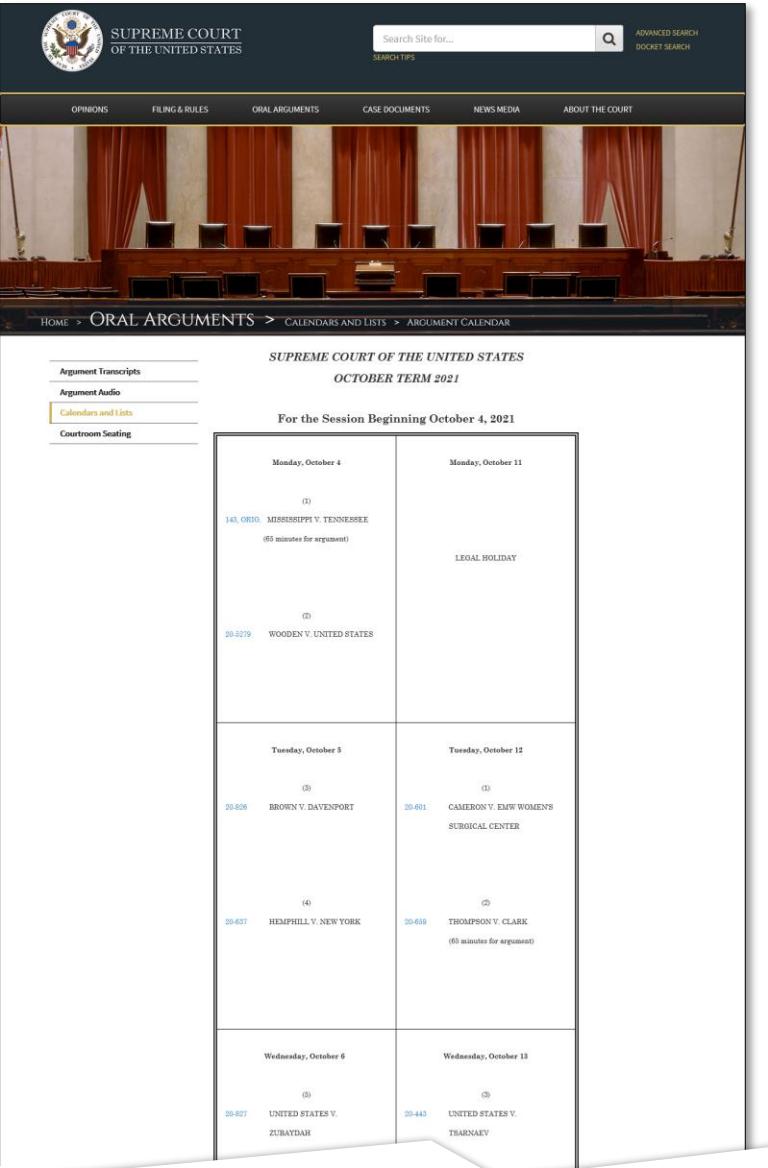
when was a webpage first published?

- when was the webpage for the oral argument live audio stream first made available?
- press release said it would go live at the start of October Term 2021
- link would be published on the home page

The screenshot shows the Supreme Court of the United States website. At the top, there is a search bar with the placeholder "Search Site for..." and a magnifying glass icon. Below the search bar are links for "OPINIONS", "FILING & RULES", "ORAL ARGUMENTS", "CASE DOCUMENTS", "NEWS MEDIA", and "ABOUT THE COURT". The main content area features a large, detailed statue of a person's head and shoulders. Below the statue, the breadcrumb navigation reads "HOME > NEWS MEDIA > PRESS RELEASES > 09-29-21". To the left of the main content, a sidebar titled "Services for News Media" includes links for "Press Releases", "Media Advisories", "Press Credentials", "Speeches", "A Reporter's Guide to Applications", and "Chief Justice's Year-End Reports on the Federal Judiciary". To the right, a section titled "For Immediate Release" lists the date "September 29, 2021" and contact information: "For Further Information Contact: Patricia McCabe (202) 479-3211". Below this, a text block describes the live audio feed availability. At the bottom of the page, there is a footer with links for various court services and a "Supreme Court of the United States" section.

when was a webpage first published?

- first oral arguments of the term were scheduled for 4 October 2021
- stream presumably went live no later than that, but what about the webpage?



Supreme Court of the United States: "Monthly Argument"

when was a webpage first published?

The screenshot shows the official website of the Supreme Court of the United States. At the top, the seal of the Supreme Court is displayed next to the text "SUPREME COURT OF THE UNITED STATES". A search bar with the placeholder "Search Site for..." and a magnifying glass icon is positioned to the right. Below the search bar are links for "OPINIONS", "FILING & RULES", "ORAL ARGUMENTS", "CASE DOCUMENTS", "NEWS MEDIA", and "ABOUT THE COURT". A prominent message in the center states: "Out of concern for the health and safety of the public and Supreme Court employees, the Supreme Court Building will be closed to the public until further notice. The Building will remain open for official business. Please see all COVID-19 announcements [here](#)." Below this message is a large photograph of the Supreme Court building's neoclassical facade with its iconic portico of Corinthian columns. At the bottom of the page, there are "Quick Links" including "Electronic Filing", "Visit", "Fellows Program", "Contact Us", and "Live Audio". On the left, a box displays "Today at the Court - Sunday, Feb 27, 2022" and a red banner stating "Building closed to the public". On the right, a calendar for February 2022 shows dates from 1 to 28, with specific days color-coded: red for Argument Days, blue for Non-argument Days, and green for Conference Days. A legend titled "Calendar Info/Key" defines these colors. At the very bottom, a footer bar contains the text "Supreme Court of the United States: [Home](#)".

when was a webpage first published?

The screenshot shows the official website of the Supreme Court of the United States. At the top, the seal of the Supreme Court is displayed next to the text "SUPREME COURT OF THE UNITED STATES". A search bar with the placeholder "Search Site for..." and a magnifying glass icon is positioned above a navigation menu. The menu includes links for "OPINIONS", "FILING & RULES", "ORAL ARGUMENTS", "CASE DOCUMENTS", "NEWS MEDIA", and "ABOUT THE COURT". A prominent message in the center states: "Out of concern for the health and safety of the public and Supreme Court employees, the Supreme Court Building will be closed to the public until further notice. The Building will remain open for official business. Please see all COVID-19 announcements [here](#)." Below this message is a large image of the Supreme Court building at night. At the bottom of the page, there is a "Quick Links" section with icons for "Electronic Filing", "Visit", "Fellows Program", "Contact Us", and "Live Audio". On the left, a box displays "Today at the Court - Sunday, Feb 27, 2022" and a red banner stating "Building closed to the public". On the right, a calendar for February 2022 is shown with a legend for "Calendar Info/Key": Argument Days (red), Non-argument Days (blue), and Conference Days (green). The calendar shows that Sunday, February 27, 2022, was an argument day.

Today at the Court - Sunday, Feb 27, 2022

Building closed to the public

- Out of concern for the health and safety of the public and Supreme Court employees, the Supreme Court Building will be closed to the public until further notice. The Building will remain open for official business. Please see all COVID-19 announcements [here](#).

S	M	T	W	T	F	S
			1	2	3	4
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26

Calendar Info/Key

- Argument Days
- Non-argument Days
- Conference Days

Supreme Court of the United States: "[Home](#)"

when was a webpage first published?

The screenshot shows the official website of the Supreme Court of the United States. At the top, the seal of the Supreme Court is displayed next to the text "SUPREME COURT OF THE UNITED STATES". A search bar with the placeholder "Search Site for..." and a magnifying glass icon is positioned above a navigation menu. The menu includes links for "OPINIONS", "FILING & RULES", "ORAL ARGUMENTS", "CASE DOCUMENTS", "NEWS MEDIA", and "ABOUT THE COURT". A prominent message in the center states: "Out of concern for the health and safety of the public and Supreme Court employees, the Supreme Court Building will be closed to the public until further notice. The Building will remain open for official business. Please see all COVID-19 announcements [here](#)." Below this message is a photograph of the Supreme Court building. Overlaid on the image is a white rectangular box containing the URL www.supremecourt.gov/oral_arguments/live.aspx. At the bottom of the page, there is a "Quick Links" section with icons for "Electronic Filing", "Visit", "Fellows Program", "Contact Us", and "Live Audio". To the right, a calendar for February 2022 is shown, with specific days highlighted in red, blue, and green according to a legend. A sidebar on the left provides information about the court's activities on Sunday, February 27, 2022.

www.supremecourt.gov/oral_arguments/live.aspx

Today at the Court - Sunday, Feb 27, 2022

Building closed to the public

- Out of concern for the health and safety of the public and Supreme Court employees, the Supreme Court Building will be closed to the public until further notice. The Building will remain open for official business. Please see all COVID-19 announcements [here](#).

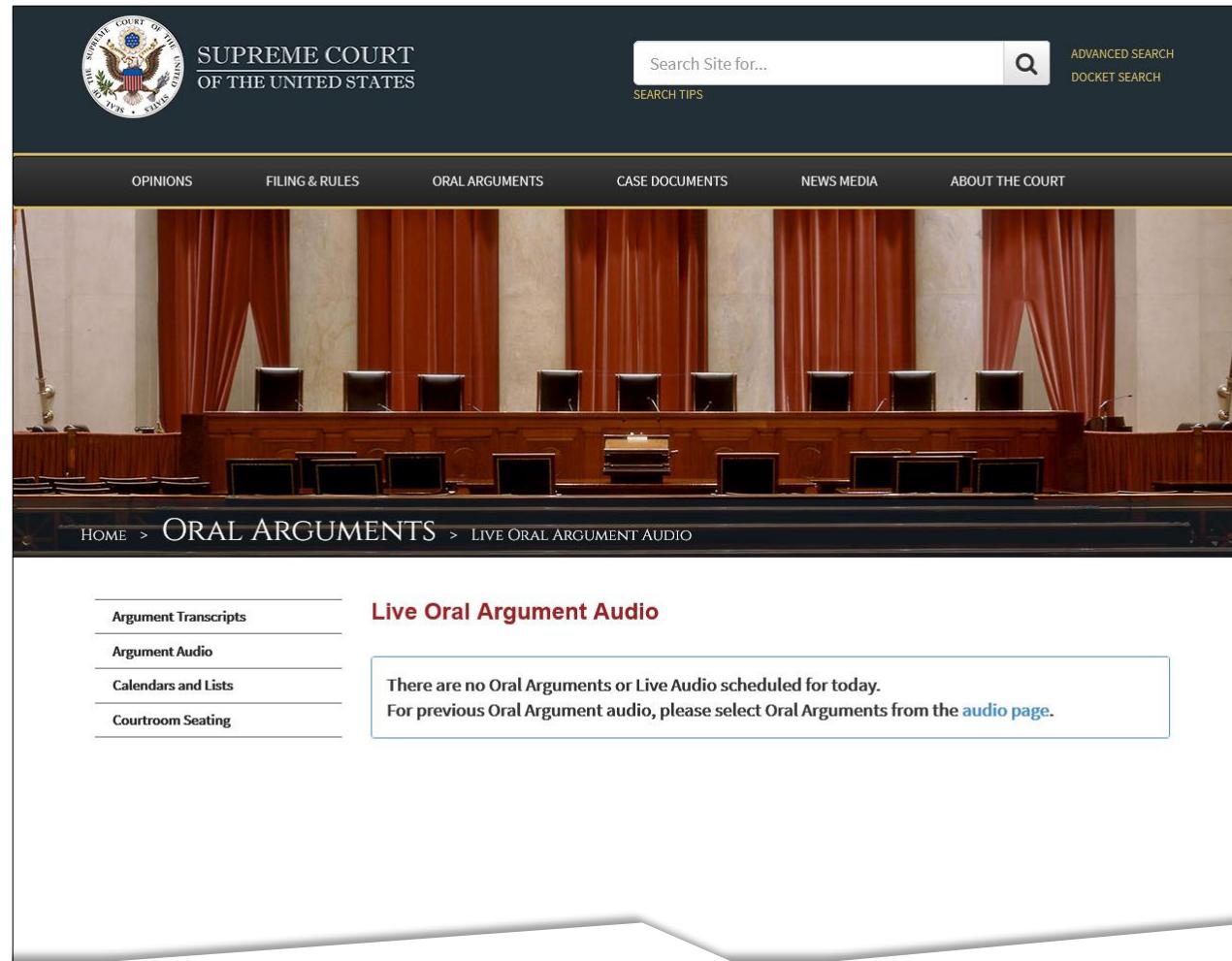
S	M	T	W	T	F	S
			1	2	3	4
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26

Calendar Info/Key

- Argument Days
- Non-argument Days
- Conference Days

Supreme Court of the United States: "[Home](#)"

when was this webpage first published?



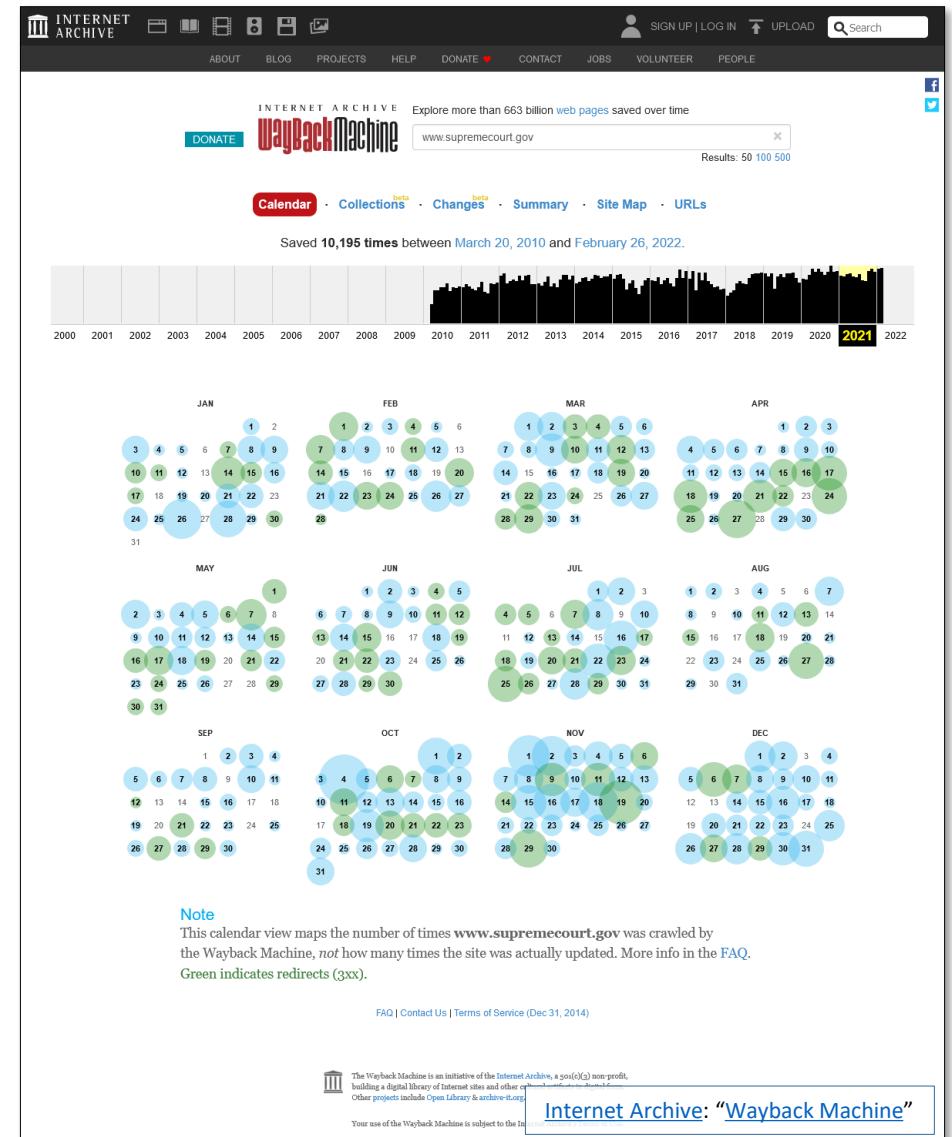
Supreme Court of the United States: "[Live Oral Argument Audio](#)"

when did link appear on home page?

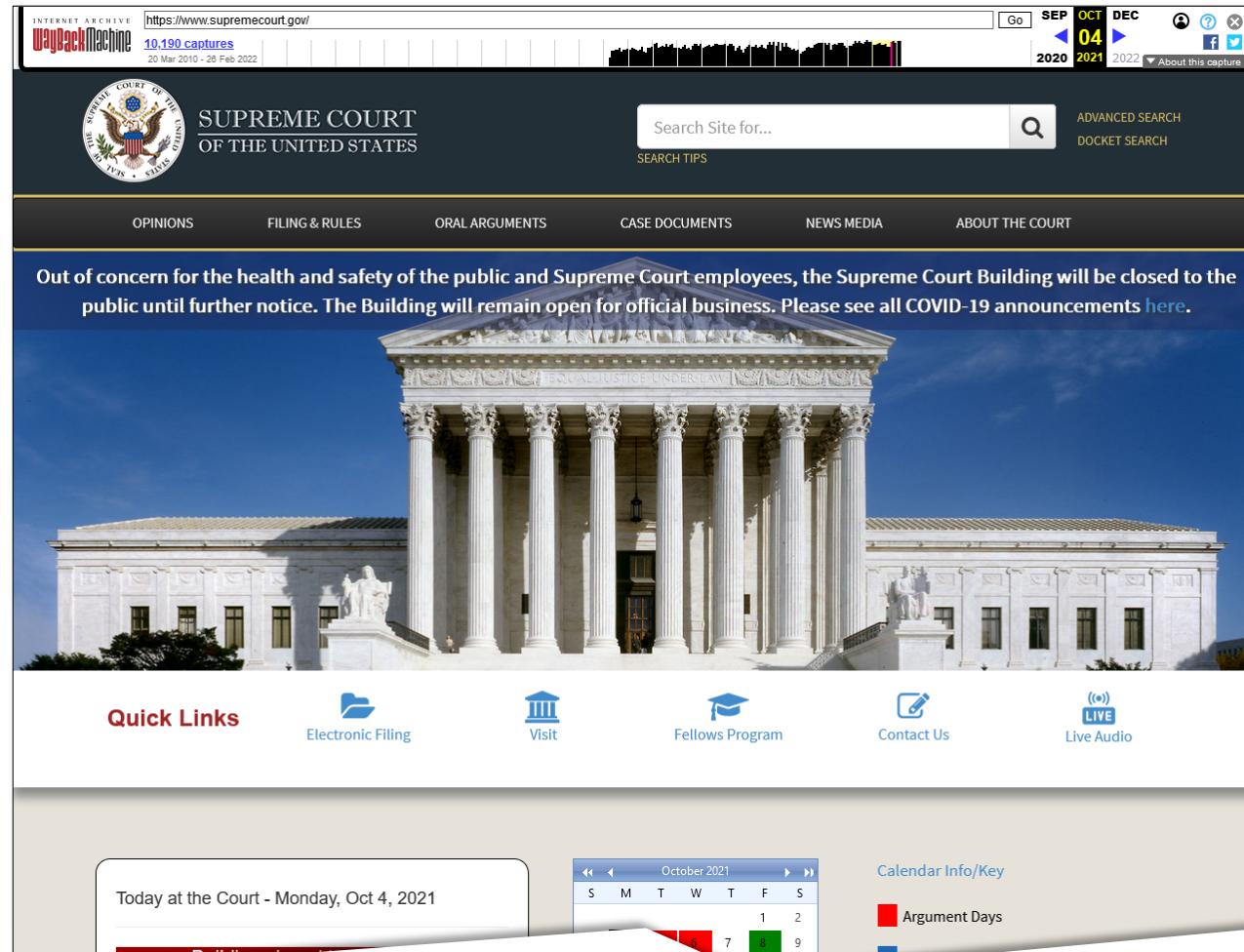
The screenshot shows the official website of the Supreme Court of the United States. At the top, the seal of the Supreme Court is on the left, followed by the text "SUPREME COURT OF THE UNITED STATES". To the right is a search bar with "Search Site for..." and a magnifying glass icon, along with links for "ADVANCED SEARCH" and "DOCKET SEARCH". Below the header is a navigation menu with links for "OPINIONS", "FILING & RULES", "ORAL ARGUMENTS", "CASE DOCUMENTS", "NEWS MEDIA", and "ABOUT THE COURT". A prominent message in the center states: "Out of concern for the health and safety of the public and Supreme Court employees, the Supreme Court Building will be closed to the public until further notice. The Building will remain open for official business. Please see all COVID-19 announcements [here](#)". Below this message is a large image of the Supreme Court building. At the bottom of the page, there are "Quick Links" including "Electronic Filing", "Visit", "Fellows Program", "Contact Us", and "Live Audio". On the left, a box displays "Today at the Court - Sunday, Feb 27, 2022" and a red banner stating "Building closed to the public". On the right, a calendar for February 2022 shows dates from 1 to 28, with specific days color-coded: red for Argument Days, blue for Non-argument Days, and green for Conference Days. A legend titled "Calendar Info/Key" defines these colors. At the very bottom, a footer bar contains the text "Supreme Court of the United States: [Home](#)".

when did link appear on home page?

- brute force (i.e. try inside-outside dates, then narrow down)
- use [Archive-It](#) to [search for “live audio”](#)
- use [CDX Server API](#) to bulk retrieve captures, then run local full-text search for “live audio”

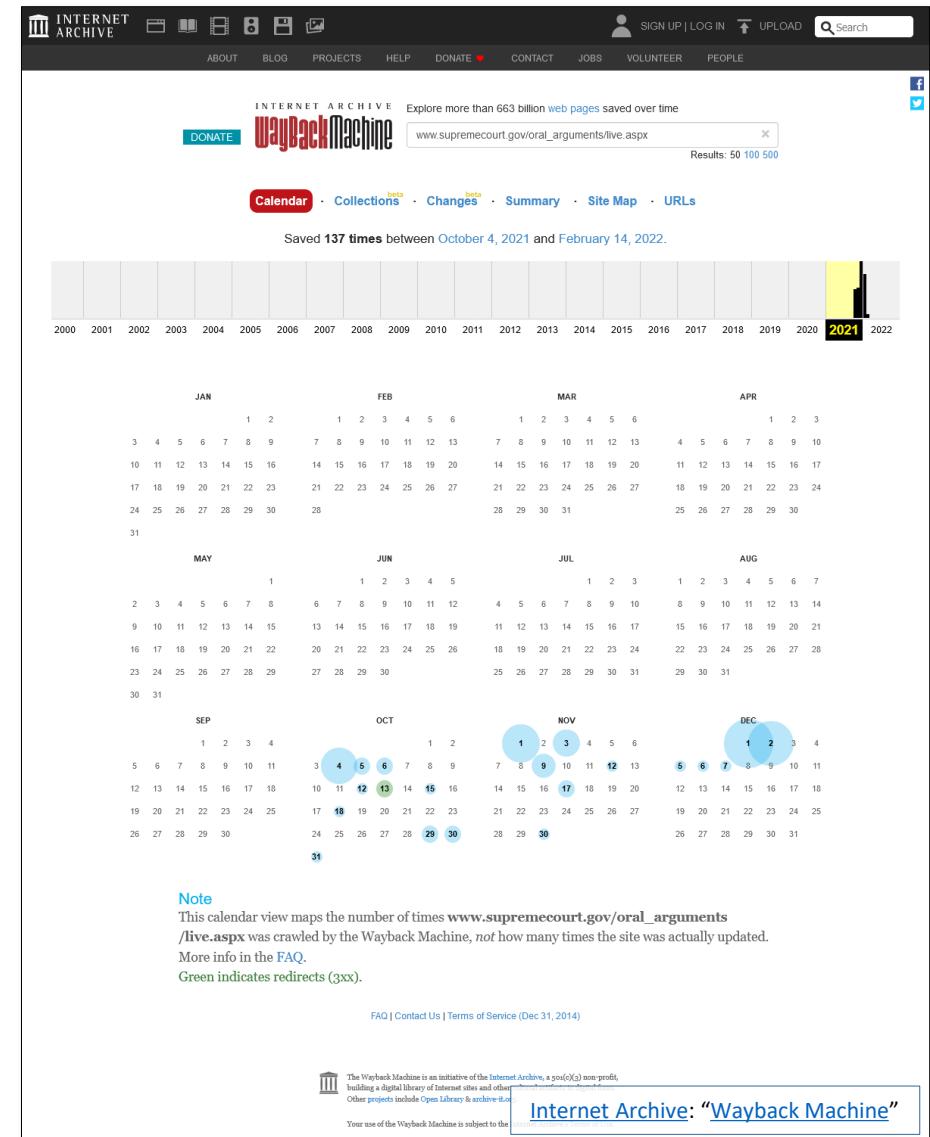


when did link appear on home page?

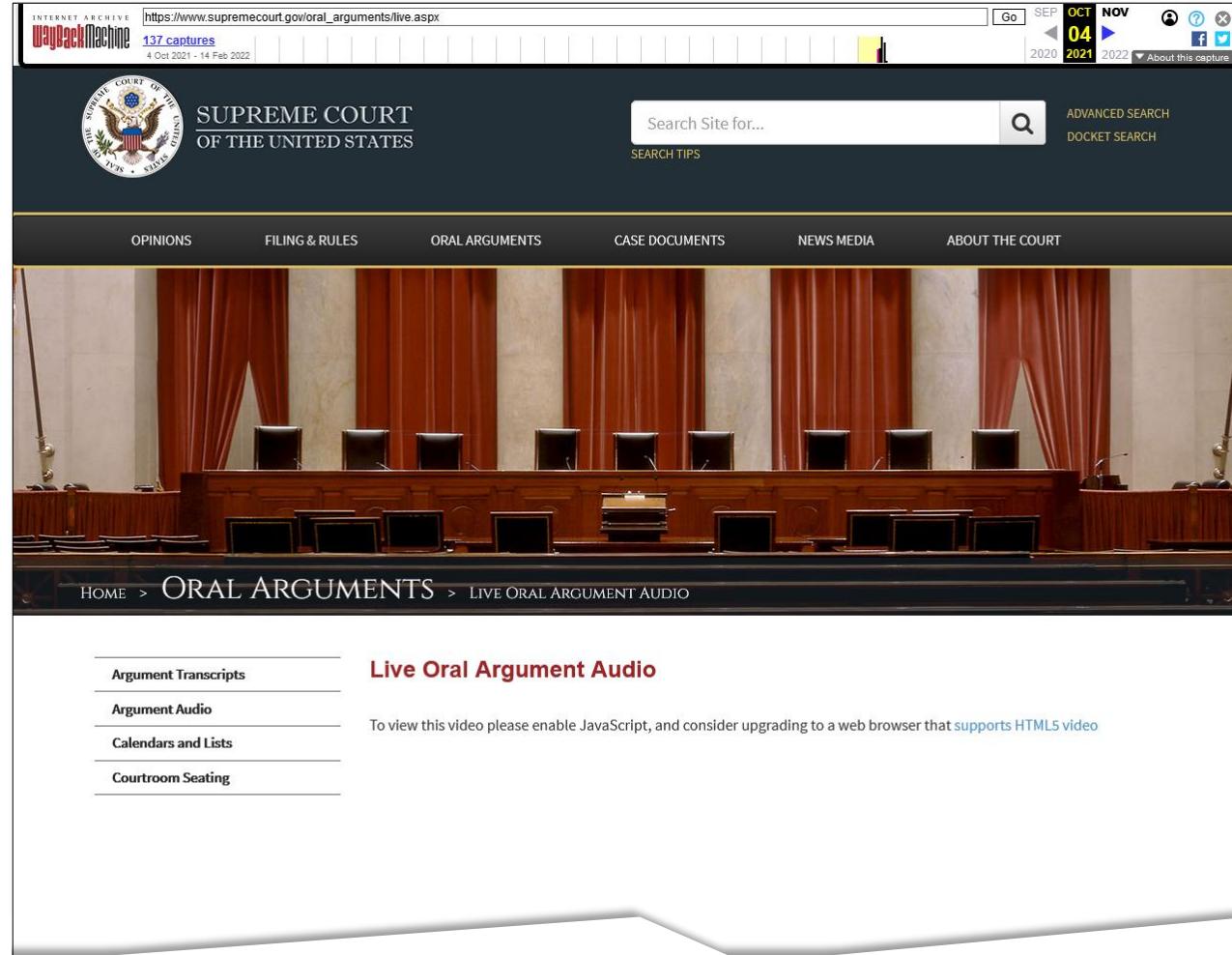


captures of webpage itself

- timeline histogram only shows captures for calendar years 2021 + 2022, up to current date
- click back to 2021
- IAWM calendar page shows captures dating back to 4 October 2021



first capture of webpage: 4 October 2021



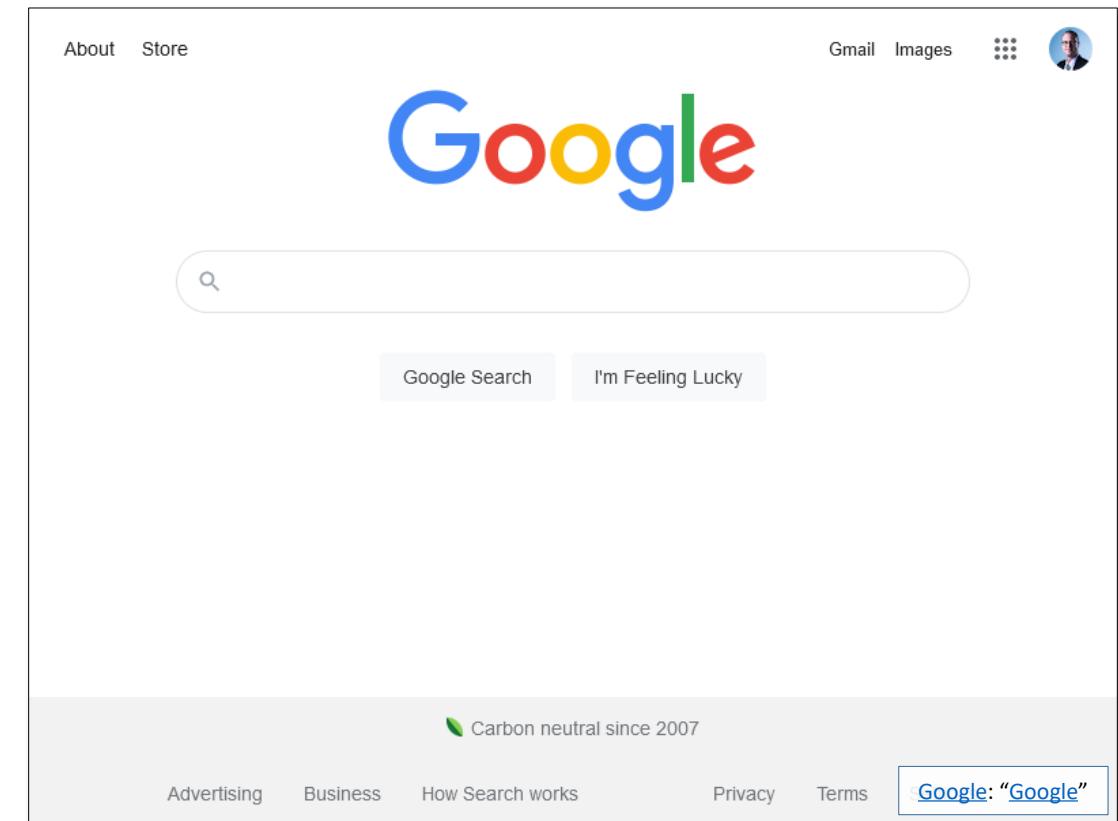


Google Search Operators

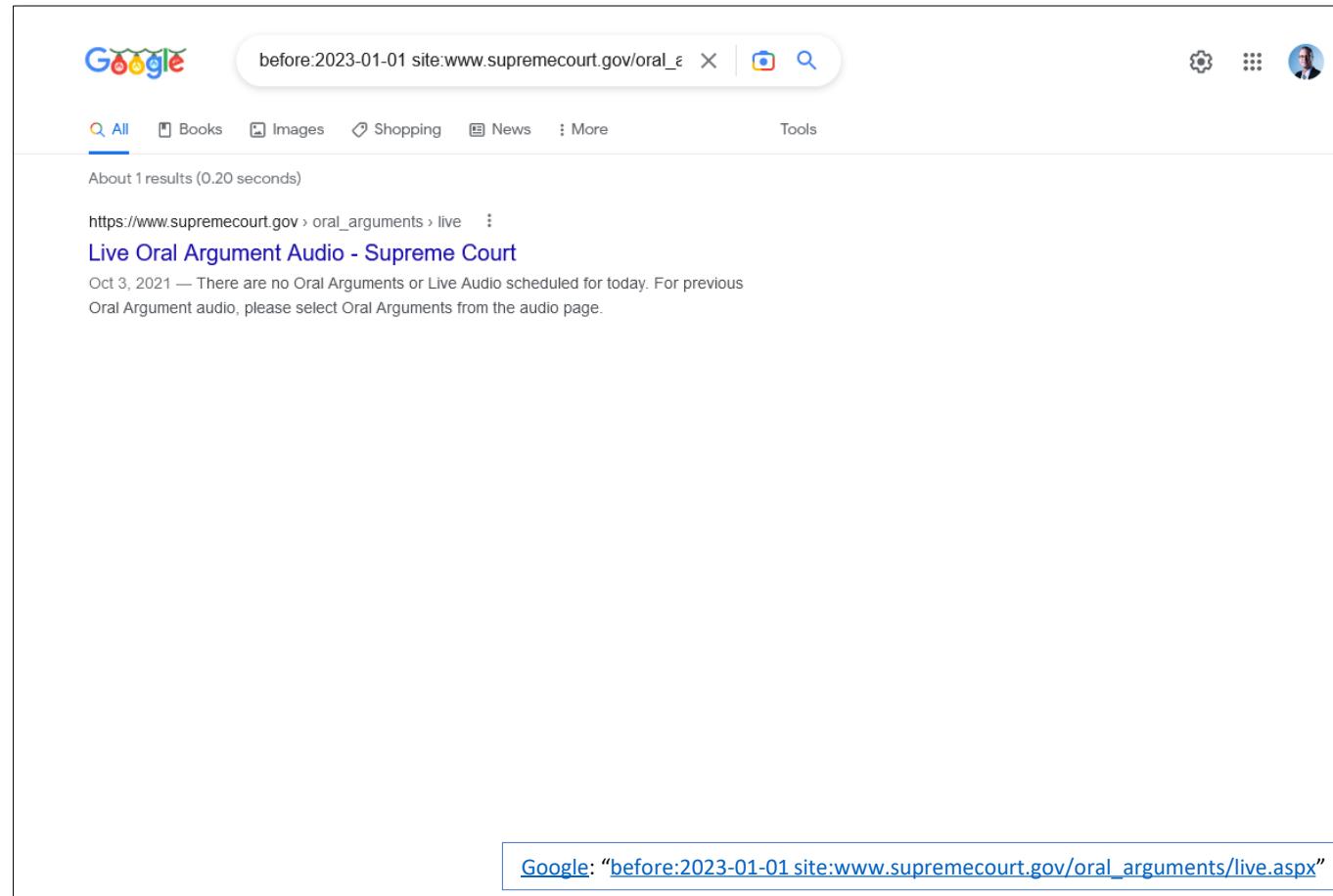
["Lego Google logo, Google, NYC, NY 3.JPG"](#) by [Cory Doctorow](#) under [CC BY-SA 2.0](#)

Google search operators

- Google search operators are specific commands that may be included in a search to refine the returned results
- the *before*: operator limits results to those that were updated before the specified date
- the *after*: operator limits results to those that were updated after the specified date
- the *site*: operator limits results to those w/ web addresses starting w/ the specified path

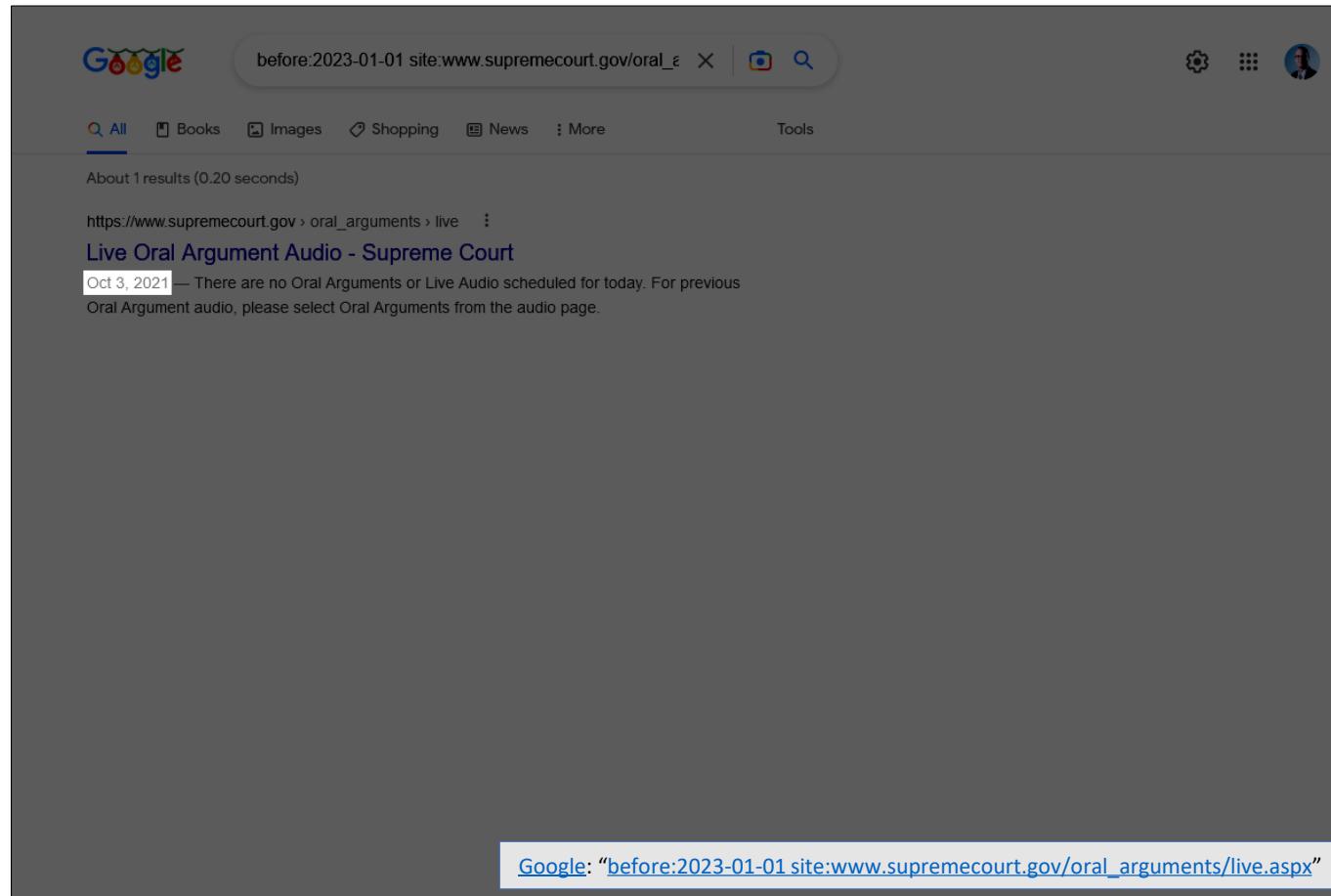


Google search *before*: 1 January 2023

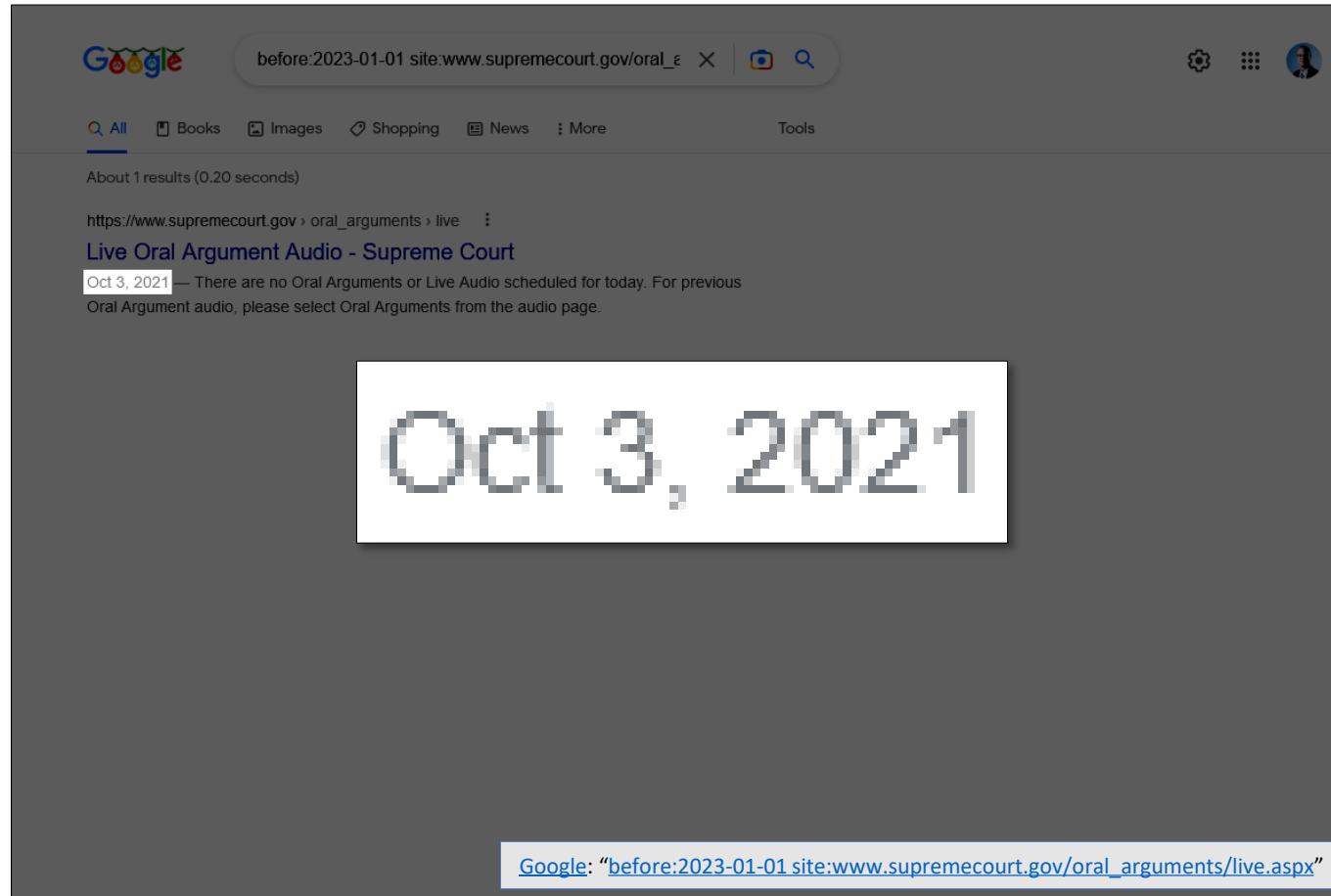


Google: "before:2023-01-01 site:www.supremecourt.gov/oral_arguments/live.aspx"

Google search *before*: 1 January 2023



Google search *before*: 1 January 2023





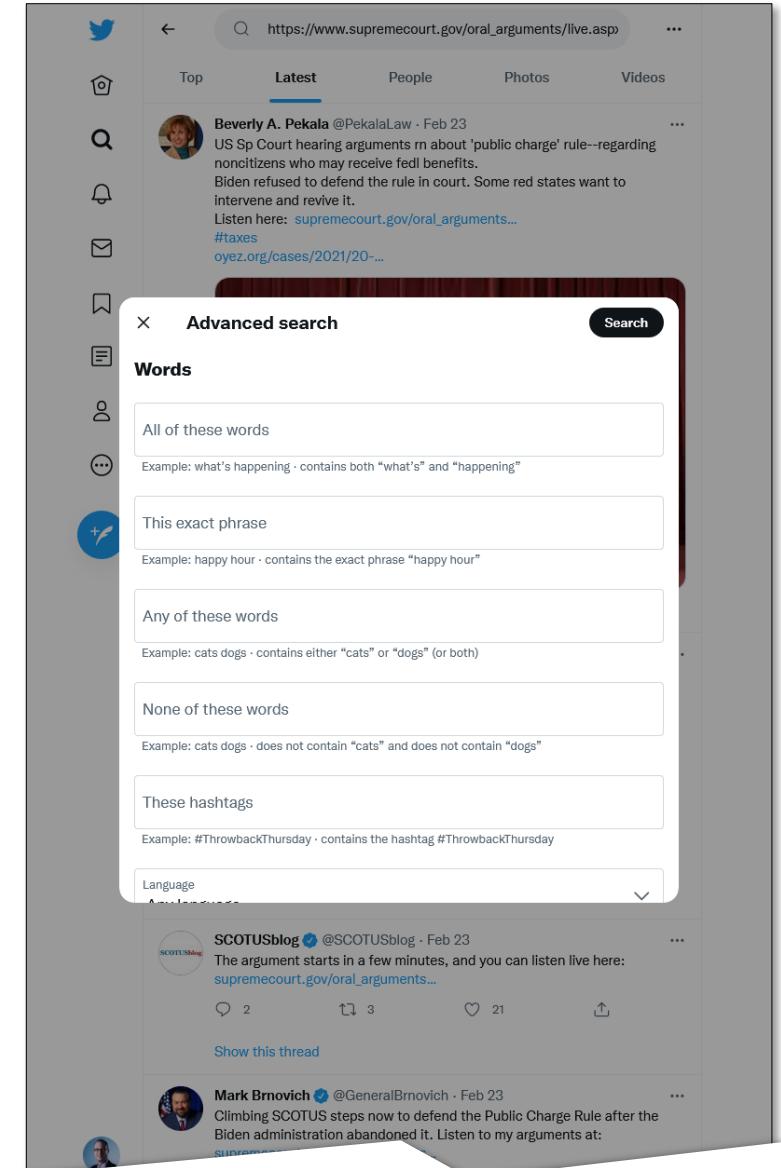
Twitter Search Operators



"Twitter escultura de arena" by Rosaura Ochoa under CC BY 2.0

Twitter search operators

- Twitter search operators are specific commands that may be included in a search to refine the returned results
- the *until:* operator limits returned tweets to those published before the specified date
- the *since:* operator limits returned tweets to those published after the specified date



Twitter: "[Twitter Search](#)"

Twitter search *until: 1 January 2023*

The image shows a Twitter search interface with the query "until:2023-01-01 https://www.supremecourt.gov/oral_ar...". The results are filtered by "Top". There are four visible tweets:

- Sarah Deer @SarahDeer72** · Nov 8, 2022
The ICWA case will be argued at 9am central on Wednesday, Nov. 9. You can listen live here:
supremecourt.gov/oral_arguments...
1 reply, 418 retweets, 596 likes
- Willie Jack's Favorite Unk 🐺 @DanDanTransient** · Nov 9, 2022
Today is the day, court convenes at 10am Eastern
HAALAND V. BRACKEEN
supremecourt.gov/oral_arguments...
1 reply, 60 retweets, 101 likes
- Jeffrey A Tucker ✨ @jeffreyatucker** · Jan 7, 2022
This is my first time to listen to Supreme Court arguments live. I wonder how many others are in the same boat. It is truly alarming.
supremecourt.gov/oral_arguments...
162 replies, 273 retweets, 1,815 likes
- Jairo I. Fúnez, PhD @Jairo_I_Funez** · Nov 9, 2022
Colonialism is an ongoing settler project!

I'm listening to the Oral Arguments for SCOTUS' hearing of the Indian Child Welfare Act (ICWA). The violent intentions of the federal government, and the colonial &
...

[Show this thread](#)

Twitter: "until:2023-01-01 https://www.supremecourt.gov/oral_arguments/live.aspx"

Twitter search *until: 1 December 2021*

The screenshot shows a Twitter search interface with the query `until:2021-12-01 https://www.supremecourt.gov/oral_arg`. The results are sorted by **Top**.

SCOTUSblog (@SCOTUSblog) · Nov 1, 2021
Coming up soon: The Supreme Court hears arguments in a pair of challenges to the Texas law that bans nearly all abortions after six weeks of pregnancy. We'll be live-tweeting the arguments here in this thread. You can listen to the arguments live here: [supremecourt.gov/oral_arguments](https://www.supremecourt.gov/oral_arguments)...

SisterSong (@SisterSong_WOC) · Nov 1, 2021
TODAY: As you know, the Supreme Court refused to block the Texas law banning abortion, but agreed to hear two cases. We will be watching. Will you? Arguments start at 10am ET. You can watch the live stream on the Supreme Court site: [supremecourt.gov/oral_arguments](https://www.supremecourt.gov/oral_arguments)....
#BansOffOurBodies

ON MONDAY, NOVEMBER 1ST THE SUPREME COURT WILL HEAR TWO CHALLENGES TO THE HARMFUL TEXAS ABORTION BAN.

[Twitter: "until:2021-12-01 https://www.supremecourt.gov/oral_arguments/live.aspx"](https://twitter.com/SCOTUSblog/status/1458811111111111111)

Twitter search *until:* 4 October 2021

A screenshot of a Twitter search results page. The search query in the bar is "until:2021-10-04 https://www.supremecourt.gov/oral_arguments/live.aspx". The results tab is selected, showing "Top" results. Below the search bar is a small image of a cartoon chicken. The main content area displays the message: "No results for 'until:2021-10-04 https://www.supreme court.gov/oral_arguments/live.aspx'". Below this message is a smaller note: "Try searching for something else, or check your [Search settings](#) to see if they're protecting you from potentially sensitive content." At the bottom of the page, there is a blue footer bar with the text "Don't miss what's happening" and a link "Twitter: until:2021-10-04 https://www.supremecourt.gov/oral_arguments/live.aspx".

Twitter search *until: 5 October 2021*

The screenshot shows a Twitter search interface with the query `until:2021-10-05 https://www.supremecourt.gov/oral_ar...`. The results are filtered by the **Top** tab. There are three visible tweets:

- SCOTUSblog** (@SCOTUSblog) - Oct 4, 2021: LIVE NOW: [supremecourt.gov/oral_arguments...](https://www.supremecourt.gov/oral_arguments...)
It's the opening day of the Supreme Court's 2021-22 term. And for the first time in more than 18 months, the justices will be back in the courtroom for oral arguments (minus Justice Kavanaugh, who tested positive for COVID last week and will participate in arguments remotely).
[Show this thread](#)
- southpaw** (@nycsouthpaw) - Oct 4, 2021: Four minutes until the first oral arguments of the term, which you can listen do directly on the Supreme Court's website for the first time today.
[supremecourt.gov/oral_arguments...](https://www.supremecourt.gov/oral_arguments...)
- Imani Gandy** (@AngryBlackLady) - Oct 4, 2021: pretty cool you can listen to oral arguments at SCOTUS now.
[supremecourt.gov/oral_arguments...](https://www.supremecourt.gov/oral_arguments...)

Each tweet includes standard engagement metrics (likes, retweets, replies) and a 'Show this thread' link.

Twitter: "[until:2021-10-05 https://www.supremecourt.gov/oral_arguments/live.aspx](https://twitter.com/search/until:2021-10-05 https://www.supremecourt.gov/oral_arguments/live.aspx)"

timestamping content changes

when first published

- in this example, lucky to have many traces + via diverse services
- more typical to be working w/ fragments
- key limitations on assertions:
 - generally only establish *no later than*
 - don't necessarily establish *the moment when*

when continuously available

- use similar techniques to document availability across successive short intervals
- continuous intermediate availability more reasonable to assume than up-down-up
- can get complicated for content situated deep in a website across redesigns or platform changes
 - content may persist, but specific web address may change

Takeaways



"Party Favors" by Carlos Saldivia under CC BY 2.0

takeaways

- temporal attributes of web content can matter (a lot)
- IAWM is a powerful tool for surfacing historical web info
- don't take archived webpages at face value
- there are multiple ways to timestamp web content
- employ strategies for authentication of IAWM evidence
 - IA affidavit
 - witness
 - judicial notice
- for any strategy, don't neglect to provide foundation for admission

Thank You



["Thank You"](#) by Brian Crawford under CC BY-SA 2.0



TECHSHOW2023

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Please complete the Speaker evaluation before you leave.

See You Next Year!

TECHSHOW 2024: February 14-17, 2024