

Gemini - a quieter web experience  
niceness through simplicity

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May 14, 2021

## Section 1

# State of the Web

# The world-wide-web

## Modern web browsers support dozens (hundreds) of standards

- CSS
- HTML 4, 5
- Javascript
- audio: .mp3 .ogg ...
- graphics: .jpg .gif .png .svg ...
- video display: .mp4 .webm ...
- cookies
- SSL encryption

## Resultant complexity is problematic

- implausible to start from scratch
- security and validation is difficult/impossible

# Problems with WWW

## User tracking

- cookies, tracking pixels, browser fingerprinting

## Security is broken

- too many (unknown) CAs trusted by default

## Pages heavy & hard to know what's downloaded

- DuckDuckGo: 26 requests - 1.3MB of content - 7 scripts
- Google.com: 35 requests - 2.2MB of content - 11 scripts

## Layout & formatting defined by the creator

- lots on the screen at once – distracting
- page complexity and weight – accessibility?

## Section 2

Gemini

# Gemini Overview

Started June 2019: Gemini is a new internet protocol that:

- is heavier than gopher
- is lighter than the web
- will not replace either
- strives for maximum power to weight ratio
- takes user privacy very seriously

## Gemini Specifications

<https://gemini.circumlunar.space/docs/specification.html>

# Gemini Goals

FAQ: [gemini://gemini.circumlunar.space/docs/faq.gmi](https://gemini.circumlunar.space/docs/faq.gmi)

## Gemini - a new application-level Internet protocol

- for distributing of arbitrary files
- a lightweight hypertext format

## Gemini is for people who are:

- opposed to the web's ubiquitous tracking of users
- tired of nagging pop-ups, obnoxious adverts, autoplaying videos
- interested in low-power computing and/or low-speed networks

## You may think of Gemini as

- "the web, stripped right back to its essence", OR
- "Gopher, souped up and modernised just a little"

# Gopher - before the WWW

## Gopher predates the web

- created at Uni Wisconsin, Madison
- intended to facilitate text search
- links documents
- used by libraries

### Floodgap Systems Gopher Server

Welcome to Floodgap Systems' official gopher server.  
Floodgap has served the gopher community since 1999  
(formerly gopher.ptloma.edu).

We run Bucktooth 0.2.9 on xinetd as our server system.  
gopher.floodgap.com is an IBM Power 520 Express with a 2-way  
4.2GHz POWER6 CPU and 8GB of RAM, running AIX 6.1 +patches.  
Send gopher@floodgap.com your questions and suggestions.

```
*****  
**                               OVER 20 YEARS SERVING YOU!                               **  
**                               Plain text is beautiful!                               **  
*****
```

[txt] Does this gopher menu look correct?  
(plus using the Floodgap Public Gopher Proxy)

[/] Super-Dimensional Fortress: SDF Gopherspace  
Get your own Gopherspace and shell account!

--- Getting started with Gopher -----  
[/] Getting started with gopher, software, more  
(what is Gopherspace? We tell you! And find out how  
to create your own Gopher world!)

[txt] Using your web browser to explore Gopherspace  
(READ IT! LEARN IT! LOVE IT!)  
(useful tips for gopher newbies, updated 17 November 2018)



# Problems with Gopher

- intended just for text
- no support for other file types (images, video ...)
- no security (plain text transfer)

## Gemini has:

- arbitrary non-ASCII character sets
- linking to content in other protocols via simple URLs
- identifies binary content using MIME types
- redirects to prevent broken links
- domain-based virtual hosting

# Gemini goals

Early Gemini discussion included three clear goals:

- 1 it should be possible to remember the entire protocol spec after reading it once or twice.
- 2 a basic but usable (not ultra-spartan) client should fit in  $\approx 50$  lines of code in a modern language.
- 3 a client comfortable for daily use which implements every single protocol feature should be a feasible weekend project for a single developer.

It will be difficult to extend in the future

so it **stays** simple and privacy conscious

## Gemini - Text formatting

- **ALL** styling is done by the client
- text lines will be wrapped
- preformatted text is not altered or wrapped
- UTF-8 is the default character set
- there's no inline formatting: i.e. no bold/italics

# Gemini clients control the page style

The image displays three side-by-side screenshots of the 'WHAT WAS WRONG' page, illustrating how different Gemini clients control the page's visual style.

- Left Screenshot (Lagrange browser):** Shows a clean, light-colored interface. The title 'WHAT WAS WRONG' is in a large, teal, monospace font. Below it is a 'Table of Content' section with a list of links, each preceded by a right-pointing triangle and a radio button. The 'The 3 last posts' section follows with a list of recent posts.
- Middle Screenshot (Kristall browser):** Shows a dark-themed interface. The title 'WHAT WAS WRONG' is in a large, white, monospace font. The 'Table of Content' and 'The 3 last posts' sections are rendered in a light color against the dark background, with radio buttons and triangles used for navigation.
- Right Screenshot (AV98 terminal browser):** Shows the page rendered in a terminal window. The title 'WHAT WAS WRONG' is in a large, black, monospace font on a light yellow background. The 'Table of Content' and 'The 3 last posts' sections are also in black text on the light background, with radio buttons and triangles used for navigation.

Same page in Lagrange, Kristall and AV98 (terminal) browsers

# Gemini Markup

There are five core elements:

- **Headings:** start with '#', '##' or '###'. The single # denotes page title.
- **List items:** begin with '\*'
- **Quotes:** these lines begin with '>'
- **Preformatted text:** begins/ends with lines of three backticks ("")
- **Links:** *on a new line*, starting with =>
  - => `https://www.reddit.com` Reddit
  - => `image-dir/giant-peach.jpg`
  - => `gemini://gemini.circumlunar.space/docs/specification.gmi`
  - => `mailto:fred@example.com`
  - => `gemini://podcast.com/episode-1.mp3`

## Why not use a subset of HTML?

If the complexity of HTML is the problem, why not use a HTML subset:

- just headers, links and blockquote?

Answered in FAQ (but briefly), using an HTML subset:

- 1 you could never be sure what a server was sending
  - you ask for one page: browser loads 30MB of images and 15 scripts ...
- 2 there's no clear delineation between Gemini and HTML sites
- 3 tracking/user profiling would still work
- 4 security of the (huge) browser still a problem

# Let's see what Gemini users have created

Demo: let's explore Gemini Space

# What's the protocol: Gemini Request/Response

*A Gemini transaction: one request - one response:*

- 1 *Client: Opens connection*
- 2 *Server: Accepts connection*
- 3 *Client/Server: Complete TLS handshake*
- 4 *Client: Validates server certificate*
- 5 *Client: Sends one line Request-URL or URL+query-string)*
- 6 *Server: Sends response header (one line), closes connection*
- 7 *Server: Sends response body (text or binary data)*
- 8 *Server: Closes connection*
- 9 *Client: Handles response*



# Gemini Uploads are very limited

Requests and response headers are limited to 1024 bytes

After connecting, Return status '10' uploads data from client:

<i>Client sends</i>	<i>gemini://mysite.com/book-request.gmi</i>
<i>Server responds</i>	<i>10 What Title:</i>
<i>User enters</i>	<i>War and Peace</i>
<i>Client resends</i>	<i>gemini://mysite.com/book-request.gmi?War%20and%20Peace</i>
<i>server Responds</i>	<i>20 text/gemini; charset=utf-8</i> <i>The contents of War and Peace</i>

# TLS Certificate TOFU vs "Known" Validation

## Gemini uses TLS v1.3 (ideally) or v1.2

- no certificate authority required
- users are based on "Trust on First Use" (TOFU) - like SSH

## Sites can identify returning users by their TLS certificate

- no need for cookies for 'session persistence'
- clients can support multiple certificates - user chooses
- if a certificate is deleted, that identity is *gone*

## Section 3

Gemini Software

# Gemini Servers

Very little load on server - Raspberry Pi is fine

## Jetforce - written in Python 3

- easy to set up
- has CGI interface

## Agate - written in Rust

- Installation: `gemini://gem.chriswere.uk/gemserver.gmi`
- or a video tutorial:

<https://share.tube/videos/watch/4fe4e1f0-7896-4b8c-bfb8-2ff19c78d8e5>

# Gemini Browsers

There's *lots* of gemini software: <https://gemini.circumlunar.space/software/>

- **Lagrange:** <https://github.com/skyjake/lagrange/releases/tag/v1.4.0>
- **Kristall:** <https://github.com/MasterQ32/kristall>
- **Amfora:** - terminal based client
  - Playing with Gemini & Amfora:  
<https://www.youtube.com/watch?v=i-iZ3R9U5ug>
- **Elpher** for Emacs - via Melpa
- **Android:** Ariane from Play Store

# Quick overview of Lagrange

Lagrange is the most feature-rich Gemini browser:

- it looks really nice!
- multiple tabs
- subscriptions
- inlining of images and audio  
=> <gemini://fixato.org/2021-03-18-drawing-with-kiddos-crayons.gmi>
- clear certificate management
- split-screen view
- available for Linux, Mac and Windows

## Gemini's not just text: Images loaded on request

### Gemini's designer intended:

- one request, one response: no hidden network activity
- images can be inlined OR loaded in external viewer – **client decides**

### An example of a photo album in Gemini

See

- <gemini://fixato.org/2021-03-10-eye-of-fixato-an-example-photo-album-for-gemini.gmi>

It has

- one image as an index
- detailed descriptions, which are good for accessibility

## Section 4

"Built on Gemini"



## Subscribing to Gemini pages

Options: Browser detects change in page headings OR simple day-timestamp scheme:

*Welcome to my Gemlog, where you can read every Friday about my adventures in urban gardening and abstract algebra!*

*## My posts*

- => bokashi.gmi 2020-11-20 - Early Bokashi composting experiments*
- => finite-simple-groups.gmi 2020-11-13 - Trying to get to grips with finite simple groups. . .*
- => balcony.gmi 2020-11-06 - I started a balcony garden!*

*## Other gemlogs I enjoy*

- => gemini://example.com/foo/ Abelard Lindsay's gemlog*
- => gemini://example.net/bar/ Vladimir Harkonnen's gemlog*
- => gemini://example.org/baz/ Case Pollard's gemlog*

from `gemini://gemini.circumlunar.space/docs/companion/subscription.gmi`

# What are people doing with it?

Lots

- **Gemini-to-Web proxy** - <https://portal.mozz.us>
- **Gemini Quickstart** - [gemini://geminiquickst.art/](https://geminiquickst.art/)
- **Gemini Search:** [gemini://geminispace.info](https://geminispace.info)
- **Geminispace aggregator** - [gemini://gemini.circumlunar.space/capcom](https://gemini.circumlunar.space/capcom)
- **TrouserMonkey.net** – [gemini://trousermonkey.net](https://trousermonkey.net)
- **Blogging Client in 30 lines**
  - [gemini://spool-five.com/gemlog/2021-04-01-second\\_script.gmi](https://spool-five.com/gemlog/2021-04-01-second_script.gmi)
- **Blogging** – [gemini://fixato.org/2020-03-25-an-uneventful-day.gmi](https://fixato.org/2020-03-25-an-uneventful-day.gmi)
- **Podcasts** – [gemini://gem.chriswere.uk/trendytalk/](https://gem.chriswere.uk/trendytalk/)
- **Proxying other services:**
  - **HackerNews** - <https://news.ycombinator.com/item?id=25986378>

Mastodon: <https://mastodon.social/tags/gemini>

## Small Web (smolweb) related sites

- **Tilde sites:** e.g.
  - <https://tildeverse.org/>
  - <https://tilde.team/>
  - [gemini://tilde.team](https://tilde.team) – Free Gemini Hosting
- **Pubnixes:** Public Unix servers
  - Super Dimensional Fortress:
    - <https://sdf.org>
    - <https://sdfeu.org>

## Interesting Gemini sites

- Konpeito is quarterly Lo-fi hip-hop & chill mixtape - <gemini://konpeito.media>
- xj9 - tech blog <gemini://sunshinegardens.org/xj9>
- Sunshine Gardens: <gemini://sunshinegardens.org>
- How I use RSS: <gemini://gemlog.blue/users/joelchrono12/1612624540.gmi>
- Progress to Offline first: -  
<gemini://gemini.circumlunar.space/solderpunk/gemlog/progress-toward-offline-first.gmi>
- News sites proxied to Gemini: <gemini://simplynews.metalune.xyz>
- One Hundred Rabbits (resilience, offline-first, sailing, cooking, Plan9, design):\  
<gemini://gemini.circumlunar.space/users/hundredrabbits>
- Gembooks & .gpub - an eBook format using Gemini:
  - <https://codeberg.org/oppenlab/gempub>

# Conclusion

## Gemini

- **for users**
  - provides very simple and accessible markup for creating pages
  - is suitable for many (but not all) documents
  - provides an ad-free, secure, and distraction-free environment
  - provides a human-scale community of users
- **for developers**
  - is simple enough to encourage experimentation
  - simple gemtext markup is easily mapped to other formats
  - has low hardware and network traffic requirements

QUESTIONS?

# Links & Reuse/License

## Links

- **Getting Started with Gemini:** <gemini://geminiquickst.art> ← Really Good
- **Gemini Home:** <https://gemini.circumlunar.space>
- **Gemini Search:** <gemini://geminispace.info>
- **Gemini on Mastodon:** <https://mastodon.social/web/timelines/tag/gemini>

## Reuse this presentation



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