A Rough Guide to the Future Internet

Summary

I have created a fast, lightweight and moderately responsive website using only html and css, discussing video game distribution. It briefly covers the history of game distribution, making note of a few interesting experiments in the field, and discusses why digital download has become so prevalent. It also covers more recent experiments, particularly cloud gaming, with an analysis of Google Stadia. It then compares cloud gaming with the current state of the art to speculate on the direction game distribution will take in the future.

Design

I decided to make a website for my exhibit, as there are a wide range of resources to use for it, and it can be highly flexible, as well as an engaging way to consume even text-based information. I decided not to use any frameworks, and only use pure html and css - no scripts. This allowed me to learn a lot about CSS and HTML, as well as browsers, as well as creating a very fast and lightweight, but still aesthetically pleasing website. However, it did make the project a lot more difficult.

My initial design idea was to structure the website like an information tree, starting with a broad overview at the top and allowing the user to navigate down the tree to get increasing detail. This turned out to be more difficult than I anticipated, so I pivoted the design idea to present the information in a similar manner on a small selection of pages, split into several selections.

For easy navigation of the website, I decided to have a persistent navigation element linking to the main pages, a "navbar". Using a framework, this would be trivial to implement, but with just css and html it's a bit more difficult. The design I ended up on was to have the main page consist of the navbar, and an `iframe` displaying the content. By setting the `iframe` as the `target` for the links in the navbar, the page displayed in the iframe changes. I also applied styling to remove the borders etc. to make the iframe appear seamless.

I wanted to have the current page in the navbar highlighted, and this should be possible without scripts by selecting the navbar element based on the `src` attribute of the iframe, but every browser I tried this with does not update any styling related to the iframe. The iframe styling does not update, and other styling does not update based on the iframe's attributes. It would be possible to do this with scripts, quite easily, but unfortunately I cannot do this.

To get started, I used a template ("Start Page") from w3schools.com, which are completely free to use, which I have since heavily modified.

One particularly hard feature to implement was the reveal for the history page. Since the same area is controlled by two different buttons, there's competing css, meaning I had to be careful with precedence in order to make it work. The "buttons" are actually styled labels for checkboxes, with the `:checked` status of them controlling the content. To fix the precedence, the `:not(:checked)` cases had to come before the

`checked` cases in the file. Along with animating the width of the elements, I animate the `font-size` of the text in the content so the text doesn't spill out of the box during the animation.

For the menu that appears on small screens, I decided to use `focus`, so the menu would disappear when you tap elsewhere (expected behaviour on mobile devices). This did, however, sacrifice the ability to toggle the menu by taping again on the button. There were also some complications, as having the menu appear only when the relevant button was focused would cause the menu to disappear before a click on a link would register, making the menu unusable. To fix this, I had to redo a lot of the styling to wrap the button and the menu in a div, so I could instead use `focus-within`, which would keep the menu visible so long as any contained element was focused. I also tried adding css to have the menu stay visible when the links inside the menu were focused, but this didn't work. Presumably, the currently focused element is unfocused before the rest of the behaviour (the same reason the links didn't work).

I decided to use image backgrounds for certain parts of the website, to make it look more interesting, but this had some minor complications with attribution as some sites expect the image to only been embedded, so provide attribution in the form of alternate text on the image, and a link on the image back to the source site. I had to extract this information and convert it into a sensible attribution link in the footer.

I also tried to make the website responsive, so it would work nicely on small screens and even mobile devices, but doing this added a lot of extra work, so I wasn't able to implement this across the whole site. The whole site is still functional on mobile and small screens, however, even if some elements don't work nicely.

Content

The history section is brief, covering mostly physical experiments, as those were the only experiments in the early history of video games (e.g. the transition from built-in games, to cartridge games, to disk games on console). There were some more interesting and relevant topics to cover, however, such as how using audio cassettes for storage led to radio shows transmitting data, including video games, the long struggle of experimenting with new distribution media before the new media finally stuck which perhaps mirrors the current struggles of cloud gaming, and interesting experiments like the Satellaview. I would have liked to go into more detail on all this, but it's not the focus of the exhibit.

The state of the art section is mostly a discussion of how digital distribution came to be so popular, and why physical games are still around if digital distribution is so good. Digital distribution has some obvious advantages over physical media, but also some less obvious ones, such as allowing the "indie game" industry to even be a thing by removing the large barrier to entry physical media created for releasing games. Digital games have practically entirely replaced physical games on computers, but on consoles physical releases are still quite common. This likely has ties to the historical "plug and play" nature of gaming consoles, where you could simply insert a game you just bought and start playing it right away. This could also be related to the rocky start digital game stores had on consoles, such as with the WiiShop which, while popular, was used to distribute small games, older games and demos, not big new releases. Additionally, due to consoles being dedicated to playing video games, internet capabilities didn't become a core feature as quickly as it did for computers.

Related to the state of the art section is the section mostly covering cloud gaming. This is the bleeding edge of game distribution, and has been experimented with since 2011 with no major successes to date. It has some key advantages over digital downloads and physical games, such as not having to wait for the game to install and update, and not requiring the expensive hardware needed to play the latest big

games. Notably, Google tried to enter the market with this technology recently with Google Stadia, having invested a lot of money in developing technology to provide the incredibly low latency required for a good gaming experience. Google already has already done a lot of work in related fields, with low-latency communication and video streaming, along with having many datacenters across the world to facilitate the service. Building on top of this, they released Stadia with very impressive game streaming technology, using their own version of the Bottleneck Bandwidth and Round-trip propagation time congestion control algorithm, along with a proprietary codec and complicated balancing algorithms tuning the experience to maintain ideal latency while attempting to provide the highest quality of video possible.

Despite their impressive technology, Google Stadia is widely considered a failure. A large reason for this was Google entering Stadia into the market as its own storefront, as well as cloud gaming service, putting it into a highly competitive market. Even though they spent tens of millions of dollars acquiring games for their storefront, it was still quite underwhelming, and the pricing scheme having customers subscribe to the service as well as buying the games failed to attract customers.

Vision

With digital download already so commonplace, the idea of paying for games but not buying real ownership of a copy is already well-accepted, making a cloud gaming service the logical step forward. On top of that, Google has already laid the groundwork with its impressive game streaming technology. Stadia's failure was unrelated to the streaming technology, and was mostly to do with the games Stadia was offering, and how it was offering access to them. All it will take now is for a company to come into the market with technology of a similar quality to Google's, but a more desirable pricing and lineup of games, and such a thing is already on the table. Nvidia's Geforce Now provides a cloud gaming services where you can play games you've bought on other stores, and Sony's Playstation Now service includes all the games in the service with the subscription. Amazon's upcoming Luna seems to have a similar idea, but where the customer pays for a selection of "channels" providing access to different libraries of games, a similar idea to cable TV.

On top of that, cloud gaming has the chance to reach an untapped market of people interested in games, but lacking the money or unwilling to make the investment into expensive hardware to really try playing the latest big games. As the expensive hardware is not required, and several of these services even offer free trials, this creates an attractive low barrier of entry to the hobby companies offering these services would be wise to exploit.

Conclusion

Ultimately, while I learned a lot about CSS and created some impressive results from it, making the website this way, and setting such a high standard for the styling, resulted in me spending far too much time on the styling, and not enough on the actual content or finding good resources to link to.

The Website

https://dck4.host.cs.st-andrews.ac.uk/Project/index.html