

Digital Design and Accessibility

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Introduction

In our increasingly digital age, digital accessibility—the practice of creating digital content to be usable, consumable, and navigable for as wide a variety of users as possible, including users who have disabilities—is paramount.

In this guide, you will learn about the importance of digital accessibility from legal, ethical, and statistical perspectives, as well as how its inclusion can benefit all types of users. You will also gain an understanding of digital accessibility as it relates to typography, the practice of composing and arranging type to be legible and readable, and video transcripts, the written form of a video's audio.

Included throughout the guide are examples of the best accessibility practices for both chapters' topics, including an <u>accessible video tutorial</u> created in collaboration with the Unity Cluster at the University of Massachusetts-Amherst.

INTRODUCTION 4

What is Digital Accessibility?

Digital accessibility is the practice of creating digital content to be easily usable, consumable, and navigable for as wide a variety of users are possible, including users who have motor, audio, visual, and/or cognitive disabilities. Accessible web content is able to be used by users who have disabilities with no extra effort of their own, for the digital content itself provides the usability and digital accessibility they require.

This chapter is devoted to taking a look at digital accessibility and why it matters in three different contexts: we will examine digital accessibility as something that is both <u>lawful and ethical</u>, analyze the <u>number of users who have disabilities</u> and are thus most impacted by accessible design choices, and investigate how and why <u>digital accessibility benefits everyone</u>, regardless of (dis)ability.

Digital Accessibility is Lawful and Ethical

Digital accessibility is a form of inclusion: by designing our digital content to be as accessible to as many users are possible, we are accounting for an audience of diverse (dis)abilities. Users who have disabilities are included in the set of people who are able to easily access digital content and are therefore given equal access to it. In this section, we're going to examine digital accessibility as a practice that is both lawful and ethical.

A Lawful Standpoint

In 1973, the Rehabilitation Act (Rehab Act) of 1973 was passed, and in it was Section 504 which specifically prohibited discrimination on the basis of disability in programs that received funding from federal agencies (Rights). The work and efforts done to pass this legislation was spearheaded by Judith Heumann, a civil rights activist and leader in the disability community, as well as other people with disabilities, many of whom were her former fellow campers at Camp Jened, a summer camp for people with disabilities (Crip Camp).

Later in 1998, this work was continued when the Rehab Act was amended with Section 508 which mandated that federal agencies make digital content accessible to those with disabilities. A major component of Section 508 is enduring that digital content is accessible without "undue burden" ("Section508.Gov"). What this means is that digital content should immediately be accessible to all users: users who have disabilities should not have to undergo extra work just to achieve a level of access

that others may instantly have. And, in the case where digital access is not immediate, Section 508 also rules that alternative means of access must also be implemented.

What Section 508 essentially legislates is that digital content must be accessible by law. It is illegal for websites to contain content only accessible to certain individuals and not others. Therefore, designing for digital accessibility is lawful.

An Ethical Standpoint

For some, that digital accessibility is required by law itself is enough motivation to produce accessibly web content. But we should also recognize and remember that digital accessibility is also a form of inclusion and therefore an ethical matter.

To return to the work of Judith Heumann and the disabled community, it's clear that the movement towards a more accessible environment (physically and digitally) is led by those most deeply impacted. When designing content, it is important to keep in mind that there are real people impacted by our choices. Our most impactful choices are those we make regarding accessibility because they can very well dictate who can readily access and consume our content, and who cannot. And when we design for all users, we're necessarily promoting inclusivity in our work, which is the ethical thing to do.

Thus, digital accessibility is not just something that we should strive for in compliance with the law, but something that we should emphasize to best meet the needs of the real people who use and consume our digital content.

Works Cited

Crip Camp. Directed by Nicole Newnham and Jim LeBrecht, Netflix, 25 Mar. 2020. Rights (OCR), Office for Civil. "Section 504 of the Rehabilitation Act of 1973." HHS.gov, 7 Sept. 2023, www.hhs.gov/civil-rights/for-individuals/disability/section-504-rehabilitation-act-of-1973/index.html.

"Section508.Gov." Section508.Gov, 2022, www.section508.gov/manage/laws-and-policies/section-508-law/.

Digital Accessibility is Statistically Necessary

The idea that disability as an "outlier" is not uncommon. People who have disabilities are severely underrepresented in our media, and what representation that does exist can play into harmful stereotypes (Brevig). The lack of genuine representation can contribute to the idea that disability is the "exception." But looking at the statistics paint a very different story and this section explores that story in detail.

A Closer Look at the Statistics

According to the Centers for Disease Control and Prevention, in 2022, more than 1 in 4 (28.1%) adults in the United States report having some type of disability (CDC). This is no small percentage, especially when we consider that this equates to a population of roughly over 70 million adults. Cognitive disabilities—those that affect an individual's ability to perform mental tasks—are the most common at 13.4%. This is followed by mobility, hearing, and vision, respectively (CDC). These disabilities impact multiple areas of a person's existence, including their ability to interact with and use web content.

To account for those with disabilities is to account for a substantial subset of the populace. Because the volume of people who have a disability is so high, the design choices we make relating to accessibility are bound to impact and reach such individuals. It is imperative that accessibility is at the forefront of conversations around design because so many users are impacted.

To argue to the contrary, we might ask the question: how is it possible to account for all disabilities in one design? It is true that improving our design for one target audience may have negative consequences for another and that designing for all disabilities may prove to be unfeasible. But what is most important is that we are having these conversations and making important decisions around such concepts, rather than forgoing them altogether.

Total accessibility is an ideal and one that we should strive to so that we can account for as many users in the 28.1% with disabilities as possible.

Works Cited

Brevig, Sheena. "The Case for Authentic Disability Representation in Media." Center for Scholars & Storytellers, Oct. 2019, www.scholarsandstorytellers.com/blog/diversity-in-hollywood-the-case-for-authentic-disability-representation-in-film-and-tv.

CDC. "CDC Newsroom." *CDC*, 16 July 2024, www.cd-c.gov/media/releases/2024/s0716-Adult-disability.html.

CDC. "Disability Impacts All of Us Infographic." *Disability and Health*, 10 Dec. 2024, www.cdc.gov/disability-and-health/articles-documents/disability-impacts-all-of-us-infographic.html.

Digital Accessibility is Beneficial to Everyone

Digital accessibility is the practice of creating content to be usable for users who have disabilities, such that as many users as possible can be accommodated and included. Examples of this might look like designing text and background colors to have strong contrast, adding alternative text to images, and <u>using appropriate text size in paragraphs</u>. These design choices, while specifically implemented to benefit users who have disabilities, also do not detract from the experience of those without. This section further argues that these and other accessibility features actually improve the user experience for all users, irrespective of their (dis)abilities (Kalbag 4).

All Users Are Impacted

Recall our initial example of designing text and background colors to have strong contrast. This design choice targets users with visual disabilities by improving readability and therefore access to the text's contents.

Now think back to a time when you were on a website that lacked this feature. Was it difficult to read? Did you understand what you were reading, or were you more focused on the act of reading itself, made more strenuous by this website's poor design choice? While such an instance might have been an unusual annoyance for users without visual disabilities, it's unfortunately the reality of many with visual disabilities. And unlike a singular website being the culprit, many websites—even ones that many might not regard as inaccessible—are at fault.

In this case, the accessible design choice of heightened contrast would not only benefit users with disabilities, but also those without. We can clearly see how accessible design choices account for all users. Furthermore, accessibility as a design practice is important because it benefits everyone while simultaneously emphasizing and meeting the needs of those with disabilities. That additional consideration, and the resultant design choices, is what ultimately creates a usable website for all types of users.

Works Cited

Kalbag, Laura, and Heydon Pickering. *Accessibility for Everyone*. New York, A Book Apart, 2017.

Accessibility in Text: Typography

Typography is the art and practice of arranging letters and text in a way that makes written language legible, readable, and visually appealing.

For content to be accessible, the text that contains that content must be readable; therefore, good typography is a fundamental component of accessible design and should be a major consideration throughout the design process. And on the other hand, while good typography can create and/or improve accessibility, poor typography can have the opposite effect: poor typography can limit, and in the worst cases eliminate, readability and thus seriously impede accessibility.

Designers should be aware of how typography, both good and poor, impacts the accessibility of their design.

This chapter is dedicated to providing a more in-depth analysis into what typography is and how it informs digital accessibility. You can find information about type anatomy, sections explaining the best practices for web typography as outlined by Section 508 of the Rehabilitation Act of 1973, and a tutorial to adjust leading on a website written in raw HTML/CSS.

Key Terms and Definitions

This section contains the terms and definitions used to describe the anatomy of type, the components that make up letterforms, and to describe whitespace, the empty areas surrounding type. You can use this section as a reference when going through the other sections in this chapter.

Type Anatomy

The type anatomy, also known as the anatomy of type, refers to the components that make up letters; all letters will have at least one, but usually more, of the following component(s).

- **Ascender**: An upward vertical stroke that extends beyond the x-height.
- Aperture: The partially enclosed whitespace of a letter. For example, the space within the bottom portion of a lowercase "a."
- Baseline: The invisible line upon which all letters sit.
- Cap height: The distance from the baseline to the top of a capital letter.
- Counter: The fully enclosed whitespace of a letter. For example, the space within an "o."
- Cross bar: The horizontal stroke(s) of a letter. For example, the cross of a "t."
- Descender: An downward vertical stroke that extends beyond the baseline.
- Dot: The accent on a lowercase "i" and "j".

- **Finial**: The end of a curved or tapered letter. For example, the end of a lower-case "e."
- Lowercase: The smaller form of a letter. This name comes from the olden days of printing, where these letters were stored in a case that was "lower" than the one used to store capital ("uppercase") letters.
- Terminal: The end of any stroke. For example, the end of a "t."
- Sans-serif fonts: Fonts with only the main strokes and no extra decoration.
 For example, Arial.
- **Serif**: Additional decorative strokes at the beginnings and ends of letters.
- Serif fonts: Fonts with serifs. For example, Times New Roman.
- **Uppercase**: The bigger form of a letter.
- Weight: The thickness of a font's strokes.
- x-height: The distance from the baseline to the top of a lowercase "x".

These components are illustrated and summarized in the following infographic on the next page:

Your Guide to the Anatomy of Type



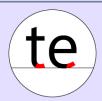
Uppercase and Lowercase

Uppercase are the taller and bigger versions of lowercase letters, which appear smaller.



Ascenders and Descenders

Ascenders and descenders are vertical strokes that extend above the x-height and below the baseline, respectively.



Terminals and Finials

Terminals mark the ends of any stroke and finials mark the ends of curved or tapered letters.



Cross Bars and Dots

Cross bars are the horizontal strokes in letters and dots are the accents on lowercase i and j.



Apertures and Counters

Counter is the fully enclosed whitespace by a letter, aperture is the partially enclosed whitespace.



Serif and Non-Serif Fonts

Serif fonts have strokes at the beginnings and ends of letters; sans-serif fonts have only the main strokes.



Baseline

The baseline is the invisible line that all letters sit upon.



Cap Height and x-Height

The cap height and the x-height are the distances between a capital letter and the lowercase x from the baseline, respectively.



Weight

The thickness of the strokes in a font. Some typefaces have variations with a heavier or lighter weight.

Whitespace

Whitespace refers to the empty areas both surrounding text. Some characters that represent empty space within text, such as tabs or spaces, necessarily are forms of whitespace, but this section focuses on the natural whitespace between letters, lines, and bodies of text.

- **Leading**: The vertical whitespace between lines of text. For example, the whitespace between the lines in this section's introduction.
- **Kerning**: The horizontal whitespace between particular letters. To adjust the kerning between letters is to adjust *only* the whitespace between them (and not the whitespace between all letters within the word).
- Tracking: The horizontal whitespace between all letters within a line or body of text. To adjust the tracking is to adjust the whitespace between all letters.

Use Sans-Serif Fonts

Serifs are small decorations at the ends of letters. Serif fonts such as Times New Roman include these decorations, whereas sans-serif fonts do not. ("Sans" comes from the French word "without", so "sans-serif" literally means without serifs.)

According to Section 508, sans-serif fonts are to be used for bodies of text on the web, because sans-serif fonts, without their extra decorations, have slightly more recognizable letterforms than serif fonts.

A Worked Example

An example is included below. The first body of text is in Times new Roman, a serif font, and the second is in Arial, a sans-serif both.

In our increasingly digital age, digital accessibility—the practice of creating digital content to be usable, consumable, and navigable for as wide a variety of users as possible, including users who have disabilities—is paramount. To incorporate accessibility in the design process is crucial.

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Though not immediately obvious, there are key differences in legibility. For example, the letters in the first body appear slightly closer together. The "ra" in practice appear to be almost touching due to the serif at the end of the "r". On the other hand, there is a clearer distinction and boundary of whitespace in the second body. This makes the letterforms much more distinct in the second body, and for users with visual disabilities, this difference is of particular importance for readability and understanding.

Works Cited

Section 508. Gov, www.section 508.gov/develop/fonts-typography/. Accessed 26 Apr. 2025.

Use Appropriate Font Size

Appropriate font size is important for accessibility because how small or how big a font is can directly impact readability: fonts that are too small can make letters and words difficult to make out and understand, and fonts that are too large typically have many line breaks that can disrupt the user's concentration.

Fonts are typically measured in point (pt) size, and according to Section 508, the preferred font size for body text is 12 pt if the user can manually resize the font and 16 pt if the user cannot. A good recommendation provided by Digital.gov, a website that outlines the best practices to follow Section 508 guidelines, is to have an average of 66 characters per line.

A Worked Example

Let's look at an example. Suppose that the user cannot change the font size. We have three fonts of different sizes, 24 pt, 12 pt, and 8 pt, respectively. Let's look at the first body of text:

In our increasingly digital age, digital accessibility—the practice of creating digital content to be usable, consumable, and navigable for as wide a variety of users as possible, including users who have disabilities—is paramount. To incorporate accessibility in the design process is crucial.

As you can see, there are multiple line breaks, even within the sentence itself, and the average number of characters per line is around 50 characters. A too-large font size forces the user to continuously move from one side of the text to the other, impeding readability and access to the text's content. And for users with cognitive disabilities, too much moving around can make it difficult to keep place.

Now let's examine the next body of text:

In our increasingly digital age, digital accessibility—the practice of creating digital content to be usable, consumable, and navigable for as wide a variety of users as possible, including users who have disabilities—is paramount. To incorporate accessibility in the design process is crucial.

There are less line breaks here and an average of about 70 characters per line, just a bit more than the recommended amount. Less line breaks are less disruptive to the user's focus while the text within those lines are still big enough to actually be seen, read, and understood by most users.

Finally, let's examine the last body of text:

In our increasingly digital age, digital accessibility—the practice of creating digital content to be usable, consumable, and navigable for as wide a variety of users as possible, including users who have disabilities—is paramount. To incorporate accessibility in the design process is crucial.

It is immediately recognizable that this font size is too small. The average character count is 157 characters, way higher than the recommended average. And while there are less line breaks, what obstructs understanding here is simply that the letterforms themselves are too small and difficult to make out, thus causing a decrease in word recognition and readability overall.

Works Cited

Section 508. Gov, www.section 508.gov/develop/fonts-typography/. Accessed 26 Apr. 2025.

"Accessibility for Visual Designers." *Digital.gov*, 9 July 2018, digital.gov/guides/accessibility-for-teams/visual-design/#typography. Accessed 26 Apr. 2025.

Use Whitespace Effectively

Whitespace refers to the empty areas both surrounding text, and when used effectively, whitespace can improve readability by separating letterforms and words from each other. In particular, leading, also more commonly known as line height, is a key factor in making web text accessible.

A good rule of thumb comes from Section 508's guidelines: "The larger the type size and line width, the larger the line height should be" ("Accessibility for Visual Designers"). For headings, the title at the start of a body of text, the line height should be about 1.3 times that of the font size; for body text, the line height should be about 1.5 times.

A Worked Example

In this example, we take a look a look at a 16 pt font with a leading of 14 pt, 24 pt, and 45 pt, respectively. Let's start with examining the first body of text:

In our increasingly digital age, digital accessibility—the practice of creating digital content to be usable, consumable, and navigable for as wide a variety of users as possible, including users who have disabilities—is paramount. To incorporate accessibility in the design process is crucial.

The text feels "squished." Because the line height is actually less than the size of the font, we have instances where letters are actually touching, such as the descender of the "y" in "variety" and the crossbar of the "T" in "To." A too-small line height obstructs readability by forcing words to be close to each other.

The next body of text has an appropriate line height:

In our increasingly digital age, digital accessibility—the practice of creating digital content to be usable, consumable, and navigable for as wide a variety of users as possible, including users who have disabilities—is paramount. To incorporate accessibility in the design process is crucial.

None of the letters are touching and there is enough leading such that the lines feel "breathable." There's room for our words to be seen and understood. But not too much room, unlike our final body of text:

In our increasingly digital age, digital accessibility—the practice of creating digital content to be usable, consumable, and navigable for as wide a variety of users as possible, including users who have disabilities—is paramount. To incorporate accessibility in the design process is crucial.

Whereas the first body of text felt too squished, this one feels a bit "lose". We can clearly make out each of the letters and, to argue to the contrary, certain users may require and actually favor this amount of leading. But on the other hand, this amount of whitespace forces the user's eyes to travel quite a bit across the page. Furthermore, users have "tendencies to follow a certain pattern while reading," so the inappropriate amount presented here can be jarring and disruptive to reading flow (Coates).

Works Cited

"Accessibility for Visual Designers." *Digital.gov*, 9 July 2018, digital.gov/guides/accessibility-for-teams/visual-design/#typography. Accessed 26 Apr. 2025.

Coates, Samantha, "White Space: An Overlooked Element of Design" (2014). *Mahurin Honors College Capstone Experience/Thesis Projects*. Paper 442. https://digitalcommons.wku.edu/stu_hon_theses/442.

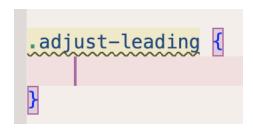
Adjust Leading in HTML/CSS

You can adjust leading, also known as <u>line height</u>, on websites written in raw HTML/CSS to improve the readability and understanding of your web content. This tutorial assumes that you have basic familiarity with HTML/CSS and already have your HTML and CSS files created and linked.

- 1. Navigate to the body of text you want to adjust in your HTML file.
- 2. Add a class with the name **adjust-leading** in the opening tag. Note: you can choose another class name if you wish, but this tutorial uses **adjust-leading**.

```
    In our increasingly digit
    consumable, and navigable
    paramount. To incorporate
```

3. Create a new style selector with selector .adjust-leading in your CSS file.



4. Assign the size of your font to the **font-size** property.

```
.adjust-leading {
    font-size: 16pt;
}
```

- 5. Calculate the line height by multiplying your font size by:
 - 1.3, if you are adjusting a heading or
 - 1.5, if you are adjusting a paragraph.

Note: this is the standard set by the guidelines for Section 508 ("Accessibility for Visual Designers").

6. Assign your calculated value to the **line-height** property.

```
.adjust-leading {
    font-size: 16pt;
    line-height: 24pt;
}
```

7. Save your files and preview your work.

Works Cited

"Accessibility for Visual Designers." *Digital.gov*, 9 July 2018, digital.gov/guides/accessibility-for-teams/visual-design/#typography. Accessed 26 Apr. 2025.

Accessibility in Videos: Transcripts

Digital accessibility is paramount in all forms of digital design, including videos. In particular, video tutorials must be clear and direct, and include features that help users easily understand, learn, and replicate the demonstration.

This chapter showcases the <u>accessible video tutorial</u> I created in collaboration with the Unity Cluster at the University of Massachusetts-Amherst, accompanied by a narrative explaining my production process and the steps that I took to ensure that the video is digitally accessible. In addition, you will also find <u>information about video transcripts</u> and how their inclusion promotes accessibility and how to <u>add transcripts</u> to your own videos on Microsoft SharePoint.

Watch the Unity Video Tutorial

The Unity Cluster, more commonly referred to as simply Unity, is a high-performance computing cluster that facilitates the research of scientists, facilitators, and system administrations, by proving them with the resources necessary to perform intensive computing tasks, such as processing data and training AI machine learning models.

For this project, I was responsible for creating a video tutorial that guides the viewer in submitting interactive and non-interactive jobs to Unity via the Unity OnDemand shell, a web-based command prompt, and Unity's GUI. This video was developed over the course of two weeks in direct collaboration with Lauren Saloio, a Research Fellow at Unity responsible for maintaining its docs and managing communications. Saloio introduced me to the platform and my task, gave me direct feedback on the video, and helped troubleshoot during the production process.

During filming, it was principal to me that this video be accessible to a wide audience: clear directions, context whenever necessary, and a refined transcript were top priorities. Other additions, such as title cards and graphics, were also included to further improve accessibility. For example, title cards allow users to navigate throughout the video and easily go back to parts they want to rewatch, which can especially help users with cognitive disabilities.

To ensure that this video fit into Unity's overall brand image, it both opens and closes the Unity's logo and uses the platform's colors—white, black, and green—throughout.

Overview of Slurm: The Job Scheduler



Watch my Unity video tutorial <u>Overview of Slurm: The Job Scheduler</u> to learn about how to schedule jobs, also known as requests to the Unity cluster, using Slurm, Unity's job scheduler, and see what an accessible video tutorial looks like.

Learn About Transcripts

A video's transcript is the text version of that video. Any spoken words are recorded verbatim, such that anyone who picks up the transcript can get an understanding of everything said during the video without actually listening to it. This is similar to subtitles, except a crucial difference is that transcripts include more accessibility features. For example, if there are unclear portions of the audio, a transcript will note and include this for the reader, whereas subtitles will often times omit this.

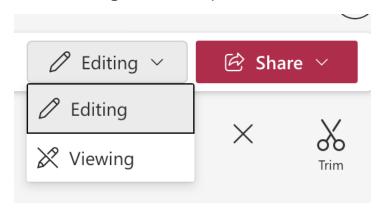
To ensure that a reader can easily find their place throughout the video and are able to follow along with the video while reading, transcripts also include timestamps. For example, a new timestamp at each new sentence or whenever there is a new break and/or clause within a sentence. For video tutorials, this feature is particularly important, as the reader needs to be aware of what is happening at all times to get a full understanding of the task at hand. And as a bonus, this can also help users locate a specific portion of the video, just by skimming the transcript.

Transcripts are particularly important for users with visual and/or cognitive disabilities. In the case of the former, transcripts can allow one to easily access and consume a video's contents without audio; in the case of the latter, transcripts can help one to find their spot in the video, easily locate portions to re-watch, and get a general understanding of its contents before or after watching. But as discussed in Digital Accessibility is Beneficial to Everyone, anyone can benefit from transcripts and their availability.

Add a Transcript

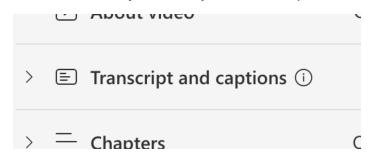
You can generate a transcript for your video on Microsoft SharePoint to help all users access and navigate through your video. This tutorial assumes your video is already hosted on SharePoint.

- 1. Open your desired video on SharePoint
- 2. Navigate to the box next to **Share** on the navigation bar. A dropdown menu opens.
- 3. Select **Editing** from the dropdown menu.



4. Select **Video settings** from the right sidebar. A menu opens to the left of the sidebar.

5. Select **Transcript and captions**. A dropdown menu opens.



- 6. Click **Generate**. A prompt displays.
- 7. Select your desired spoken language and click **Generate**. Note: you may need to wait a few minutes while the transcript is automatically generated.
- 8. Reload the page after the transcript has finished generating. Notice that there is a new **Transcript** section on the sidebar.
- 9. Click **Transcript** on the sidebar. Your transcript appears.
- 10. Click on any text box to edit its contents.

About Me



Gianna Leidich is a junior at the University of Massachusetts-Amherst studying English and computer science, and completing the Professional Writing and Technical Communications certificate.

After entering UMass as a primary computer science major and taking a course in human-computer interaction, Gianna decided to center her studies around information design and user experience research. She is interested in digital design, web development, and social media management and marketing.

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About This Project

This project was created on a MacBook Air running macOS 15 Sequoia, using MadCap Flare, Adobe Illustrator, Notion, and Goodnotes. All screenshots were taken by me using macOS's Screenshot tool.

Created for English 381: Professional Writing & Technical Communication II, this project was implemented with a focus on digital accessibility education, both for myself and my audience. Starting from my first introduction to digital accessibility, to watching the documentary Crip Camp, and finally finishing up this project, I know that digital accessibility is something on which I will focus for the rest of my academic and professional career. This project is the first stepping stone in that journey.

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