IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

RAVENWHITE LICENSING LLC,	§	
	§	Civil Action No. 2:23-cv-00418
Plaintiff,	§	
	§	
v.	§	**JURY TRIAL DEMANDED**
	§	
WALMART INC. and	§	
WAL-MART STORES TEXAS, LLC,	§	
	§	
Defendants.	§	

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff RavenWhite Licensing LLC ("RavenWhite" or "Plaintiff") brings this patent infringement action against Defendants Walmart Inc. and Wal-Mart Stores Texas, LLC (collectively, "Walmart" or "Defendants") based on information and belief, as follows:

NATURE OF THE ACTION

1. This is a civil action for infringement of U.S. Patent Nos. 10,594,823 (the "'823 Patent") and U.S. Patent No. 11,562,402 ("the '402 Patent") (collectively, the "Patents-in-Suit"), attached hereto as Exhibit A and Exhibit B, under the patent laws of the United States, 35 U.S.C. § 1 *et seq*.

2. RavenWhite brings this patent infringement action to protect its valuable patented technology relating to (1) an advanced machine-to-machine authentication technique that stores encoded information at a client device on the basis of network resource requests determined by a

server; and (2) improved advertising systems that enable tiered bidding, cross-selling, and retargeting in online marketing systems.

THE PARTIES

3. RavenWhite is a Delaware limited liability company with a principal place of business at 145 La Sandra Way, Portola Valley, CA 94028.

4. Defendant Walmart Inc. is a company organized under the laws of the State of Delaware with a principal place of business at 702 SW 8th St., Bentonville, AR 72716. Walmart Inc. may be served with process through its registered agent CT Corporation System, located at 1999 Bryan Street, Suite 900, Dallas, TX 75201.

5. Defendant Wal-Mart Stores Texas, LLC is a company organized under the laws of the State of Delaware with a principal place of business at 702 SW 8th St., Bentonville, AR 72716. Wal-Mart Stores Texas, LLC may be served with process through its registered agent CT Corporations System, located at 1999 Bryan Street, Suite 900, Dallas, TX 75201.

JURISDICTION AND VENUE

6. This action arises under the patent laws of the United States, Title 35 of the United States Code. Accordingly, this Court has subject matter jurisdiction under 28 U.S.C. § 1331 and 1338(a) and the patent laws of the United States, 25 U.S.C. § 1, *et seq*.

7. In 2000, Walmart started its eCommerce initiative through the creation of walmart.com. As Walmart states in its Annual Report, its eCommerce presence continues to grow. In 2007, Walmart, using its physical stores, started its "Site to Store" service, allowing "customers to make a purchase online and pick up merchandise in stores." Walmart 2023 Annual Report, at 6 (2023), https://s201.q4cdn.com/262069030/files/doc_financials/2023/ar/Walmart-10K-Reports-Optimized.pdf.

8. As the Report further indicates, Walmart has "heavily invested in omni-channel and

eCommerce innovation" to "leverage technology, talent and expertise" to grow its service and product offerings both through the Walmart website and physical stores. *Id*. at 6.

9. Walmart maintains an omni-channel sales and marketing strategy:

> [Walmart] integrat[es] retail stores and eCommerce, through services such as pickup and delivery, in-home delivery, ship-from-store, and digital pharmacy fulfillment options. As of January 31, 2023, we had more than 4,600 pickup locations and more than 3,900 same-day delivery locations. Our Walmart+ membership offering provides enhanced omni-channel shopping benefits including unlimited free shipping on eligible items with no order minimum, unlimited delivery from store, fuel discounts, access to Paramount+ streaming service, and mobile scan & go for a streamlined in-store shopping experience. We have several eCommerce websites, the largest of which is walmart.com. We define eCommerce sales as sales initiated by customers digitally and fulfilled by a number of methods including our dedicated eCommerce fulfillment centers and leveraging our stores, as well as certain other business offerings that are part of our flywheel strategy, such as our Walmart Connect advertising business....

Id. at 7.

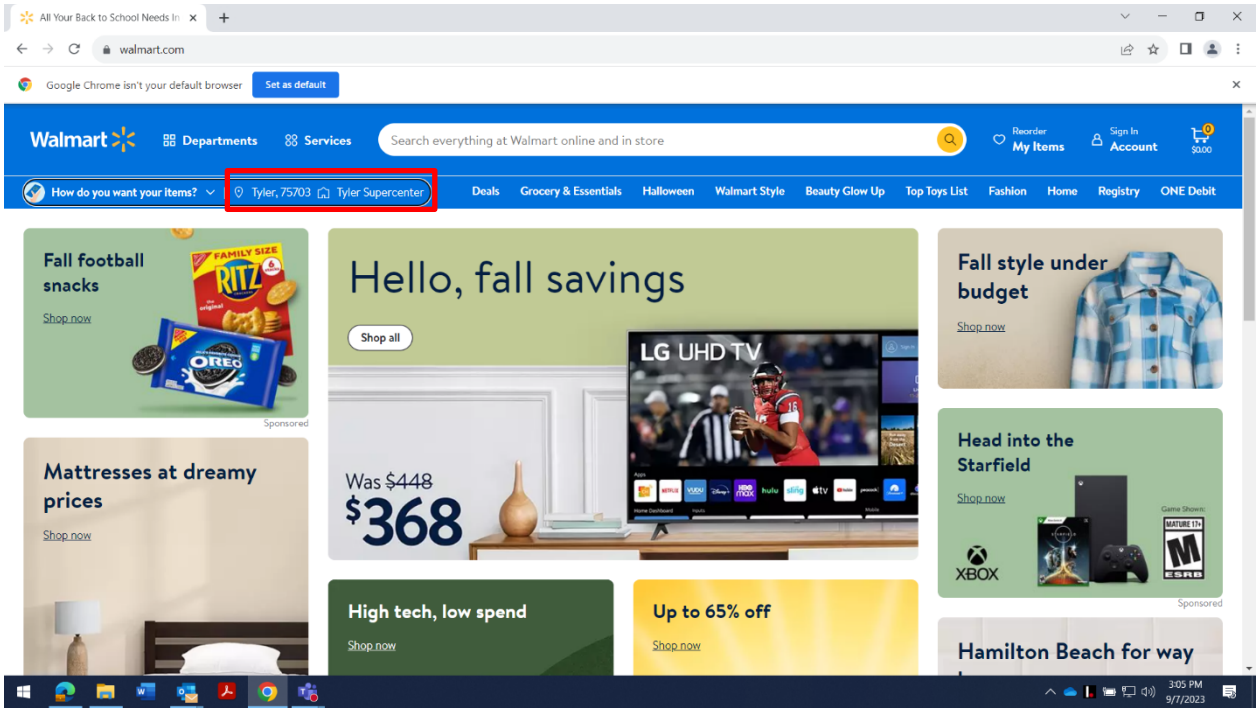
10. Walmart describes how it controls and directs its physical stores and fulfillment centers in relation to its eCommerce business and omni-channel marketing and sales strategy:

> We continue to invest in supply chain automation and utilize a total of 163 distribution facilities which are located strategically throughout the U.S. For fiscal 2023, the majority of Walmart U.S.'s purchases of store merchandise were shipped through these facilities, while most of the remaining store merchandise we purchased was shipped directly from suppliers. General merchandise and dry grocery merchandise is transported primarily through the segment's private truck fleet; however, we contract with common carriers to transport the majority of our perishable grocery merchandise. We ship merchandise purchased by customers on our eCommerce platforms by a number of methods from multiple locations including from our 34 dedicated eCommerce fulfillment centers, as well as leveraging our ability to ship or deliver directly from more than 3,900 stores.

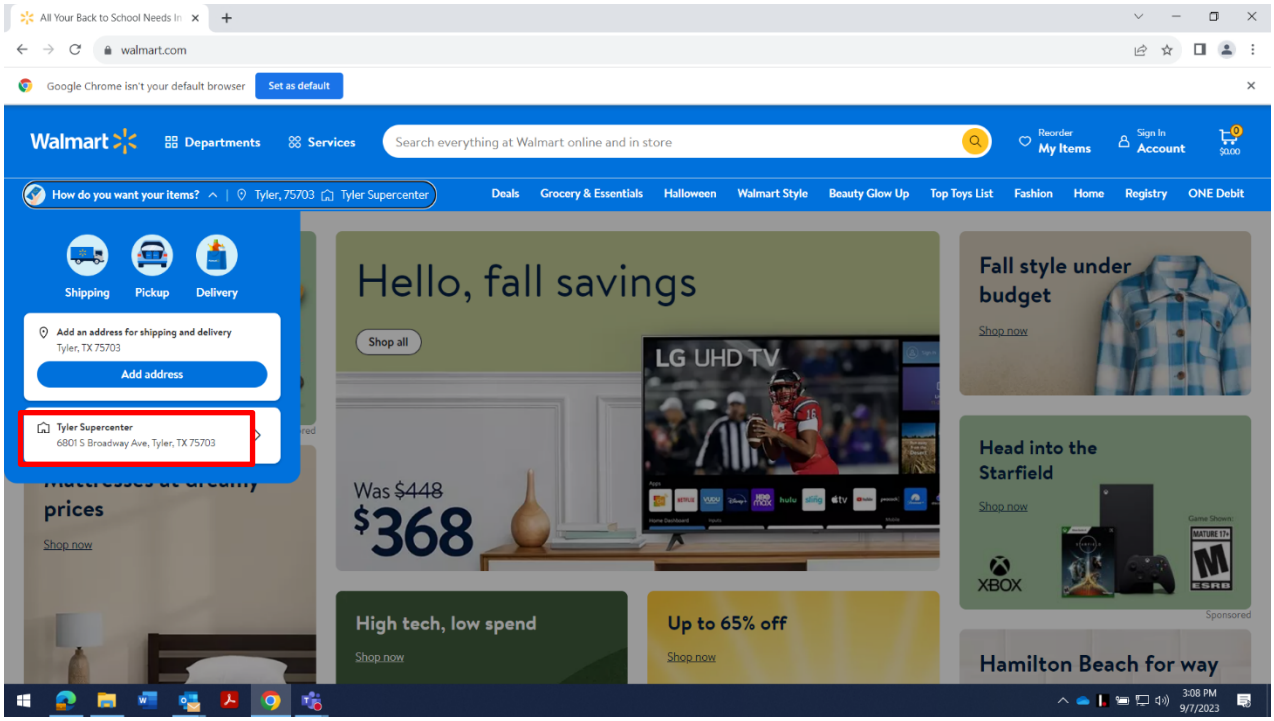
Id. at 8.

11. As an example, when a customer residing in the Eastern District of Texas, Tyler, Texas, shops on the Walmart website, the website directs the customer to a specific Walmart store in the Eastern District of Texas that is geographically close to the customer. In image below, the webpage recommends the Tyler Supercenter in Tyler, Texas as the physical Walmart store where

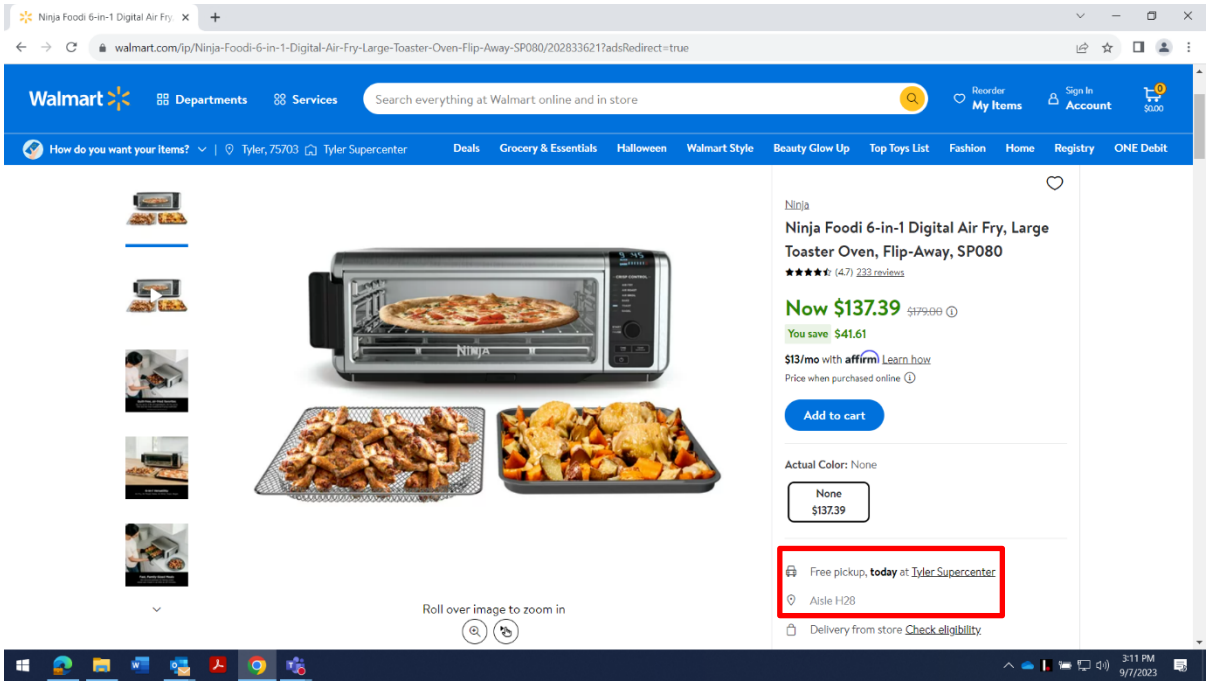
the customer's online shopping choices will be fulfilled.



12. Another screenshot from the same online transaction shows that the Walmart website will provide the specific address of the store, in this case, 6801 S Broadway Ave, Tyler, Texas 75703.



13. Moreover, when the customer selects a specific product, the website directs the customer to a local store (the Tyler Supercenter in this example) where the customer can pick up that item. The website even informs the customer of the specific location within the store (Aisle H28 in the image below) where that item is located.



14. As another example, the Walmart website runs a web page specifically dedicated to "Walmart in Texas." *See* https://corporate.walmart.com/about/location-facts/united-states/texas. That web page details and describes Walmart's operations in Texas. Further, the Walmart website also has a "Texas Walmart Stores" listing all of the Walmart stores in Texas. *See* https://www.walmart.com/store-directory Walmart has stores across the Eastern District of Texas in Allen, Denton, Frisco, Lewisville, Longview, Marshall, McKinney, Plano, Sherman, and Tyler. The Walmart in Marshall, Texas is located at 1701 E End Blvd N, Marshall, Texas 75670.

15. Walmart has and maintains substantial contacts with the State of Texas by maintaining its physical retail operations, which includes retail stores and fulfillment centers. These are managed in conjunction with Walmart's direction and control of the Walmart website. In total, Walmart has more than 500 retails stores and 25 distribution and fulfillment centers in Texas. In addition, Walmart's Global Tech corporate operation conducts business out of an office in Plano, Texas. This department develops and manages technology synonymous with Walmart's intricate and extensive supply chain infrastructure, which is used in managing and maintaining the business through the Walmart website. Upon information and belief, this office is located at 5830 Granite Pkwy, Suite 300, Plano, TX 75024.

16. The Court has personal jurisdiction over Walmart Inc. consistent with the Texas Long Arm Statute. This Court has personal jurisdiction over Walmart Inc. in this action because, among other reasons, Walmart Inc. has committed infringing acts within the Eastern District of Texas giving rise to this action and has established minimum contacts with the forum state of Texas. Walmart Inc. conducts business in this District.

17. Further, this Court has personal jurisdiction over Walmart Inc. because Walmart Inc. has committed and continues to commit acts of infringement in violation of 35 U.S.C. § 271.

Walmart Inc. has purposefully availed itself of the privileges of conducting business in the State of Texas, and Walmart Inc. regularly conducts business within the State of Texas. Moreover, this Court has general jurisdiction over Walmart Inc., including due to its continuous and systematic contacts with the State of Texas. Further, on information and belief, Walmart Inc. is subject to the Court's jurisdiction, including because Walmart Inc. has committed patent infringement in the State of Texas.

18. Walmart Inc. is subject to the specific personal jurisdiction of this Court because RavenWhite's patent infringement claims against Walmart Inc. specifically arise from Walmart Inc.'s acts of infringement in the State of Texas. Among these acts of infringement include directing and controlling the operation of the walmart.com interactive website using the patented inventions, and specifically targeting residents of Texas with this website to further the sale of products and services to those customers.

19. This includes but is not limited to Walmart Inc.'s directing and controlling the operation of the Walmart website so customers can find a Walmart retail store in Texas where the customer can shop, pick up products ordered through Walmart's website, or visit the Website for some other commercial purpose. Walmart Inc. generates immense revenue through making the Walmart website available to customers in the State of Texas.

20. The Court has personal jurisdiction over Wal-Mart Stores Texas LLC consistent with the Texas Long Arm Statute. This Court has personal jurisdiction over Wal-Mart Stores Texas LLC in this action because, among other reasons, Wal-Mart Stores Texas LLC has committed infringing acts within the Eastern District of Texas giving rise to this action and has established minimum contacts with the forum state of Texas. Wal-Mart Stores Texas LLC conducts business in this District.

21. Further, this Court has personal jurisdiction over Wal-Mart Stores Texas LLC because Wal-Mart Stores Texas LLC has committed and continues to commit acts of infringement in violation of 35 U.S.C. § 271. Wal-Mart Stores Texas LLC has purposefully availed itself of the privileges of conducting business in the State of Texas, and Wal-Mart Stores Texas LLC regularly conducts business within the State of Texas. Moreover, this Court has general jurisdiction over Wal-Mart Stores Texas LLC, including due to its continuous and systematic contacts with the State of Texas.

22. Wal-Mart Stores Texas LLC is subject to the specific personal jurisdiction of this Court because RavenWhite's patent infringement claims against Wal-Mart Stores Texas LLC specifically arise from Wal-Mart Stores Texas LLC's acts of infringement in the State of Texas. Among these acts of infringement include directing and controlling the physical store and fulfillment center locations where customers who order products through Walmart's website can pick up their purchased items.

23. Venue is proper in this judicial district pursuant to 28 U.S.C. §§ 1391(b), (c) and 1400(b). Walmart maintains a continuous physical presence within the District. On information and belief, Walmart is subject to the venue in this District, including because Walmart has committed patent infringement in this District. Pursuant to 25 U.S.C. § 271, Walmart infringes the Patents-in-Suit by the infringing acts described herein. Walmart solicits and induces customers and users in this District, including via its website.

PATENTS-IN-SUIT

24. U.S. Patent No. 10,594,823 ("the '823 Patent"), titled "Method and Apparatus for Storing Information in a Browser Storage Area of a Client Device," duly and legally issued on March 17, 2020, from U.S. Patent Application No. 15/706,556, filed on September 15, 2017.

25. The ’823 Patent is owned by RavenWhite Security, Inc., a Delaware corporation located at 145 La Sandra Way, Portola Valley, CA 94028. RavenWhite Security is a research-oriented cybersecurity company. It develops technologies that address consumers’ technical and ease-of-use demands. RavenWhite Security’s mission is to make e-commerce safer for consumers.

26. Plaintiff RavenWhite Licensing LLC is a Delaware limited liability company, located at 145 La Sandra Way, Portola Valley, CA 94028.

27. Plaintiff RavenWhite Licensing LLC is the exclusive licensee of all right, title, and interest in and to the ’823 Patent, including the right to assert all causes of action arising under said patent and to seek damages and all other remedies for the infringement thereof.

28. U.S. Patent No. 11,562,402 (“the ’402 Patent”), titled “Advertising Model,” duly and legally issued on January 24, 2023, from U.S. Patent Application No. 17/201,306, filed on March 15, 2021.

29. The ’402 Patent is owned by Security Technology, LLC, a Delaware limited liability company located at 7 East 20th Street #12f, New York, NY 10003.

30. Plaintiff RavenWhite Licensing LLC is the exclusive licensee of all right, title, and interest in and to the ’402 Patent, including the right to assert all causes of action arising under said patent and to seek damages and all other remedies for the infringement thereof.

’823 PATENT BACKGROUND

31. The ’823 Patent relates generally to client-server communications and causes a browser to store information in a browser storage area of a client device. More specifically, the ’823 Patent discloses an advanced machine-to-machine authentication technique that stores encoded information at a client device on the basis of network resource requests determined by a

server. Authentication has grown significantly in importance as e-commerce has shifted retail sales online and customers have a growing need to create online accounts.

’402 PATENT BACKGROUND

32. The ’402 Patent relates to improved advertising systems that enable tiered bidding, cross-selling, and retargeting in online marketing systems. Cross-selling is the notion of offering a second product based on a believed purchase of a first product. Retargeting (also known as remarketing) is the notion of reaching out to a user in response to a non-purchase and offering them a product.

COUNT I

(Walmart’s Infringement of U.S. Patent No. 10,594,823)

33. RavenWhite incorporates by reference and re-alleges the foregoing paragraphs as if fully set forth herein.

34. Walmart has infringed and continues to infringe the ’823 Patent by creating, maintaining, and operating its system of physical stores and computer networks (“the Walmart system”) including the servers through which it operates the Walmart website and allows customers to make online shopping selections that can be fulfilled at physical stores.

35. Claim 1 of the ’823 Patent, for example, reads as follows:

A system, comprising: one or more processors configured to:

receive a network resource request from a client device, wherein the network resource request corresponds to a first cookie of a first type that was caused to be stored to the client device during a first previous network session, wherein the first cookie of the first type was caused to be stored to the client device at least in part by causing the client device to initiate a set of network resource requests determined during the first previous network session, wherein the client device initiating the set of network resource requests caused data representative of the set of network resource requests to be stored at the client device, wherein a second cookie of a second type different from the first type was caused to be stored at the client device during a second previous network session, and wherein the first cookie of the first

type is stored in a second client device browser storage area different from the first client device browser storage area;

based at least in part on the network resource request from the client device corresponding to the first cookie of the first type caused to be stored at the client device during the first previous network session, determine information that was encoded and stored in the client device;

perform a first identification of at least one of the client device and a user of the client device using the first cookie of the first type, wherein the first identification is performed using the first cookie of the first type at least in part by using the determined information that was encoded and stored in the client device;

perform a second identification of at least one of the client device and the user of the client device using the second cookie of the second type; and

perform a determination based at least in part on (1) a presence of a network resource request associated with one of the first cookie and the second cookie, and (2) an absence of a network resource request associated with the other of the first cookie and the second cookie; and

a memory coupled to the one or more processors and configured to provide the one or more processors with instructions.

'823 Patent, 15:33-16:12 (claim 1).

36. Walmart has directly infringed, and continues to directly infringe, one or more claims of the '823 Patent, including at least claim 1 of the '823 Patent, literally and/or under the doctrine of equivalents, by or through making, using, offering for sale, selling within the United States and/or importing the Walmart System.

37. The Walmart System comprises one or more processors configured to use cookies and other tracking technologies on its websites when receiving and responding to client requests such as accessing web pages. For example, the Walmart System uses cookies on its websites when responding to client requests such as accessing web pages:

What are cookies, and how does Walmart use cookies on its websites?

Cookies are small pieces of text sent as files to your computer by the website you are visiting. Walmart.com uses its own and third-party cookies to improve your shopping and browsing experience, and to allow the site to recognize you as you move from one page to another. Without cookies enabled, you will still be able to browse the site, but will not be able to take advantage of certain website features. Walmart uses two main types of cookies - session cookies and persistent cookies:

- Session cookies exist for only as long as your browser remains open. For example, it allows us to remember the items added to your shopping cart as you browse different pages on Walmart's websites. Please note that if you block cookies from walmart.com, you may not be able to make purchases on the website.
- Persistent cookies last from one visit to another. We use persistent cookies to provide you a more personalized shopping experience and to help you navigate our websites more efficiently. For example, persistent cookies are used to remember who you are and show you items you have previously browsed online or to show you which local store you have chosen as your "home" store.

You can manage your cookie preferences from within your browser. Please see the Help section on your browser for information on how to manage your cookie preferences.

Walmart Privacy Notice Frequently Asked Questions, Walmart, https://corporate.walmart.com/privacy-security/Walmart-Privacy-Notice-Frequently-Asked-Questions (last visited September 11, 2023).

38. The one or more processors of Walmart's System are configured to receive a network resource request from a client device, wherein the network resource request corresponds to a first cookie of a first type that was caused to be stored to the client device during a first previous network session, wherein the first cookie of the first type was caused to be stored to the client device at least in part by causing the client device to initiate a set of network resource requests determined during the first previous network session, wherein the client device initiating the set of network resource requests caused data representative of the set of network resource requests to be

stored at the client device, wherein a second cookie of a second type different from the first type was caused to be stored at the client device during a second previous network session, and wherein the first cookie of the first type is stored in a first client device browser storage area and the second cookie of the second type is stored in a second client device browser storage area different from the first client device browser storage area.

39. For example, clients accessing the Walmart website receive network resources including cookies and other similar tracking data. Walmart's Privacy Policy describes using multiple types of tracking technologies, such as first-party cookies, third-party cookies, web beacons, pixels, and similar technologies:

What Personal Information Do We Collect?

We may collect or receive the categories of personal information listed below, which may depend on the products or services you may use, as well as your device and account settings. Not all categories of personal information will be collected or received about every individual.

- **Basic Personal Identifiers**, such as name, telephone number, physical address, email address, government-issued identifiers (e.g., national identification numbers, driver's license numbers), and signatures
- **Device and Online Identifiers**, such as account login information, Mac address, IP address, cookie IDs, mobile ad IDs, and social media information

…

Advertising, Marketing, and Other Related Technology Partners: We work with various advertising, marketing, and other related technology partners so we can both market our products to you and provide advertising services to other companies.

- Advertisers. These are companies that place ads through our advertising services. Advertisers may use pixels or cookies in their ads that collect information from/about you to help them understand how you respond to their ads.

…

- Advertising Technology Providers. We work with companies that use cookies, pixels, beacons and similar technologies to tailor the ads you see using information collected about you over time on our Sites, and across other participating websites and mobile services. Advertising Technology Providers include ad servers, advertising agencies, technology vendors that support media buying and selling, and research firms. For more information about your choices related to interest-based advertising, see Interest-Based Advertising Preferences in the *How Can You Set Your Preferences?* section below.

Walmart Privacy Notice, Walmart, (updated July 1, 2023), https://corporate.walmart.com/privacy-security/walmart-privacy-notice [hereinafter Walmart Privacy Notice]. Walmart's California Consumer Privacy Act Notice also indicates that the Walmart System may collect customers' personal identification information as well as information about their online activity, including browser activity and browsing history:

What Are the Categories of Personal Information Collected?

We may collect or receive (and may have collected or received during the 12-month period prior to the Last Updated date of this California Notice) the categories of personal information listed below. Not all categories will be collected or received for every individual.

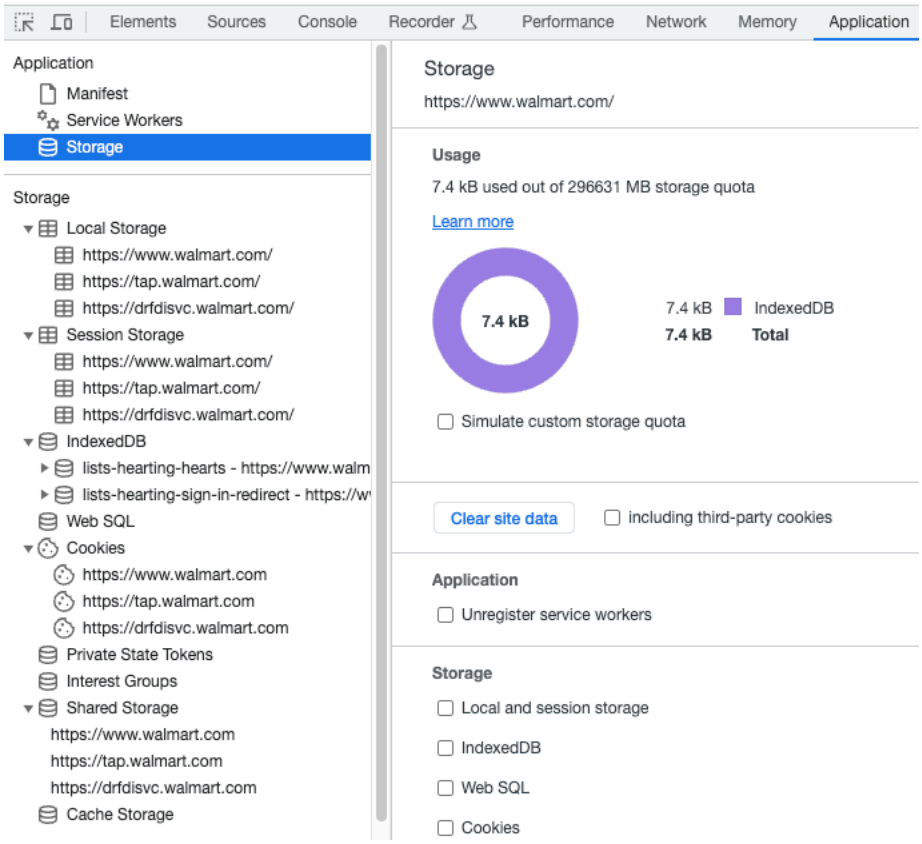
- **Identifiers:** Personal identifiers, such as name, telephone number, physical address, email address, national identification numbers, driver's license numbers, and signatures
- **Device Information and Online Activity:** Device and online identifiers, keystroke patterns indicative of human or bot website/app usage, mobile and web network activity and related information (such as Mac address, IP address, cookie IDs, browser activity, and other information associated with your browsing history), and social media information

. . .

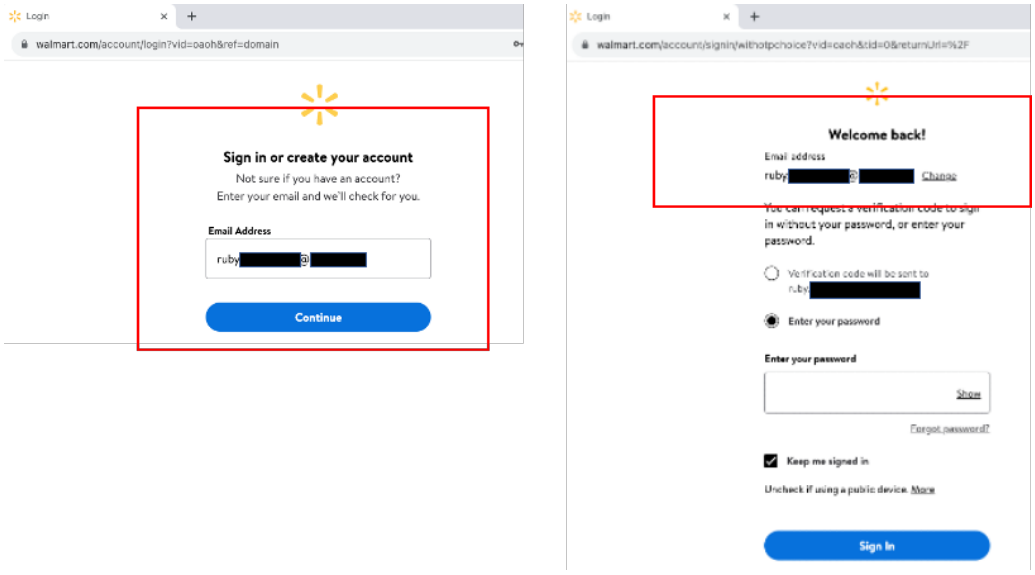
- **Sensitive Personal Information:** Government-issued identifiers (such as social security, driver's license, state identification card, or passport number), account log-in and financial information (such as payment card details), and precise geolocation

Walmart California Consumer Privacy Act Notice, Walmart, (updated January 1, 2023), https://corporate.walmart.com/privacy-security/california-privacy-rights [hereinafter Walmart CCPA Notice].

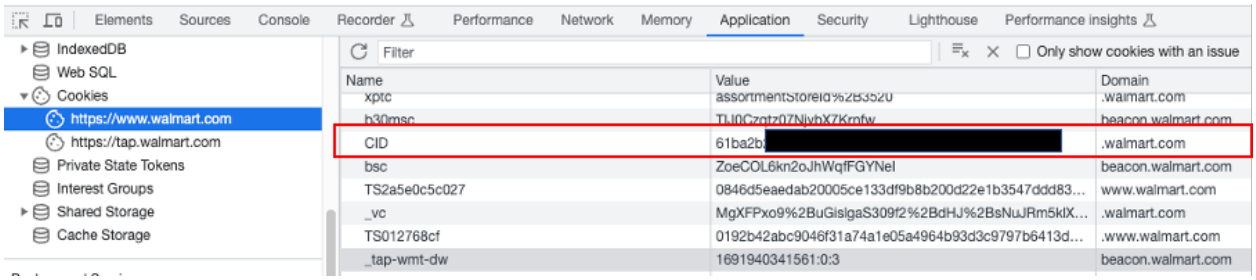
The cookies and trackers used by Walmart are stored in different locations on the client device, such as Local Storage, Session Storage, Cookies, and Shared Storage. This is demonstrated in the image of the "Application" tab in Google Chrome for the Walmart website below:



40. The network resource received by the Walmart System's one or more processors corresponds to a first cookie of a first type that was caused to be stored to the client device during a first previous network session, wherein the first cookie of the first type is caused to be stored to the client device at least in part by causing the client device to initiate a set of network resource requests determined during the first previous network session, wherein the client device initiating the set of network resource requests causes data representative of the set of network resource requests to be stored at the client device. For example, Walmart requires a user to sign into their account in order to purchase any products or services and subsequently remembers the user when she logs back in as demonstrated in the screenshots below:

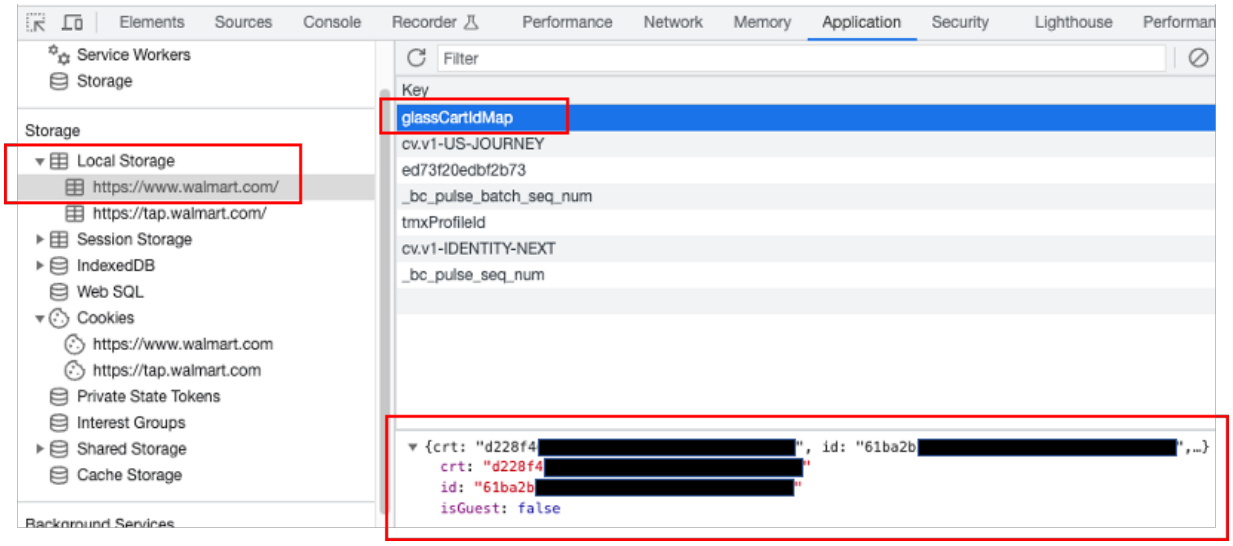


41. The Walmart System associates unique identifiers with users as evidenced by each user's unique customer identifier. The Walmart System causes a cookie of a first type, such as the "CID" cookie, which provides a unique customer identifier, to be stored to a client device, such as a user's computer. For example, during a first previous network session, if a user signs in by putting the user's email address and password into the Walmart website, Walmart's servers will authenticate the client, which will cause a first CID cookie to be stored on the client device. The CID cookie is an ID string and is stored in the "Cookies" area of the browser, as shown in the screenshot below:



42. The Walmart System also causes a second cookie of a second type, different from the first type, to be stored at the client device during a second previous network session. The "glassCartIdMap" cookie is an example of a second cookie. If a user is signed in and adds an item

to their cart during a second previous network session, Walmart will cause a glassCartIdMap cookie to be stored in the "Local Storage" area of the client device, as shown in the screenshot below:

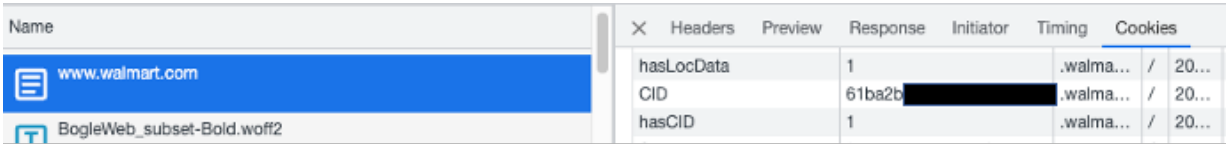


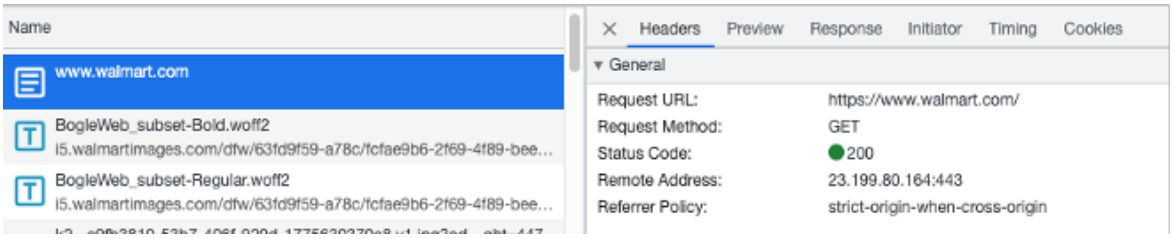
43. The glassCartIdMap cookie is a JSON data structure holding information including a cart identifier, which is different from the CID cookie's ID string. The first cookie of the first type is stored in a first client device browser storage area and the second cookie of the second type is stored in a second client device browser storage area different from the first client device browser storage area. For example, as described above, the CID cookie is a different type of cookie than the glassCartIdMap cookie since at least CID is an ID string and glassCartIdMap is a JSON data structure. The CID cookie is also stored in the cookies area of the client device, whereas glassCartIdMap is stored in local storage.

44. The Walmart System's one or more processors, based at least in part on the network resource request from the client device corresponding to the first cookie of the first type caused to be stored at the client device during the first previous network session, are configured to determine information that was previously encoded and stored in the client device. The CID cookie is a first cookie of the first type stored at the client device during the first previous network session. Based

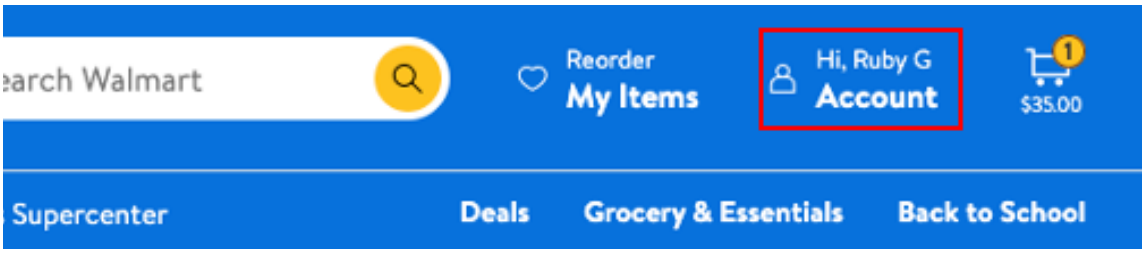
at least in part on the network resource request from the client device corresponding to the CID cookie, the Walmart System's one or more processors determine information that was encoded and stored in the client device, such as whether a user has previously visited the site.

45. For example, a network resource request from the client causes servers in the Walmart System to determine information (such as a user "Id") that was encoded and stored in the CID cookie. If the CID cookie is deleted or is otherwise absent, Walmart will determine that the user is not authenticated and force the user to log in again, but if the CID cookie is present, Walmart will display the user's account information without requiring a log in. For example, a page request using the previously stored CID cookie is shown below:

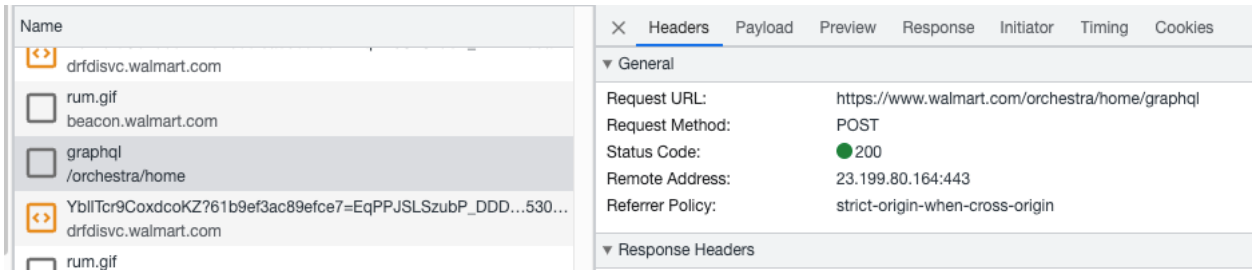


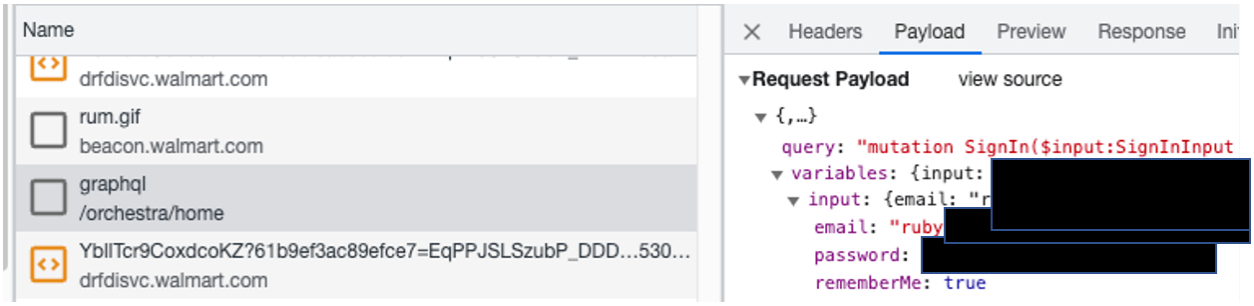


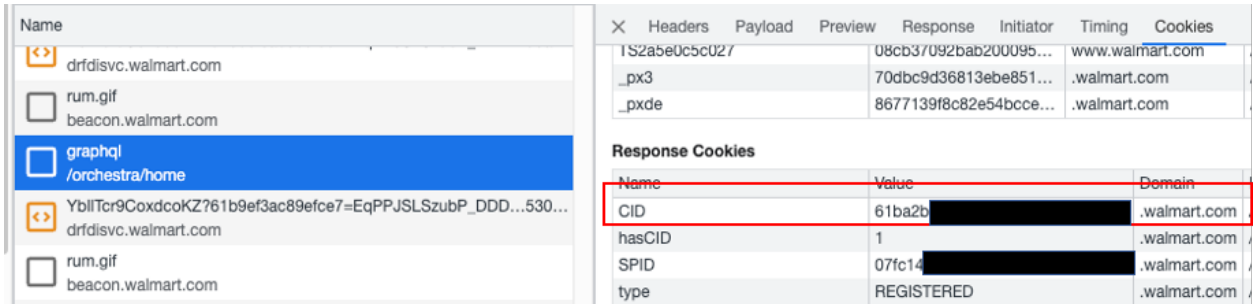
46. When servers in the Walmart system recognize the user through information present in the CID cookie, the user will see their name displayed instead of a sign-in page, as shown here:



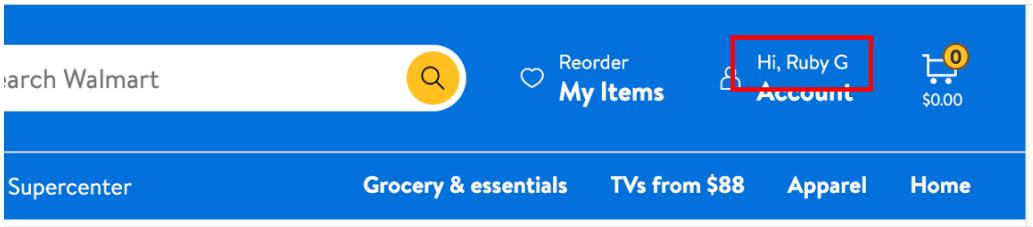
47. The Walmart System's one or more processors are configured to perform a first identification of at least one of the client devices and a user of the client device using the first cookie of the first type, wherein the first identification is performed using the first cookie of the first type at least in part by using the determined information that was encoded and stored in the client device. For example, the Walmart System performs a first identification of at least one of the client devices and a user of the client device using the previously stored first CID cookie. The CID cookie is tied to, and can be used to identify, the user because it contains the user's ID. Walmart associates a CID cookie with at least one of the client devices and a user of the client device with an email and verification code sign-in process. The CID cookie is persistent and unchanged across sessions on a user's device. For example, when a user signs in with a valid CID cookie, the Walmart System identifies the client device and a user of the client device. The user's login information is posted to the Walmart System's servers, which respond with a CID cookie after authentication, as demonstrated in the following screenshots:



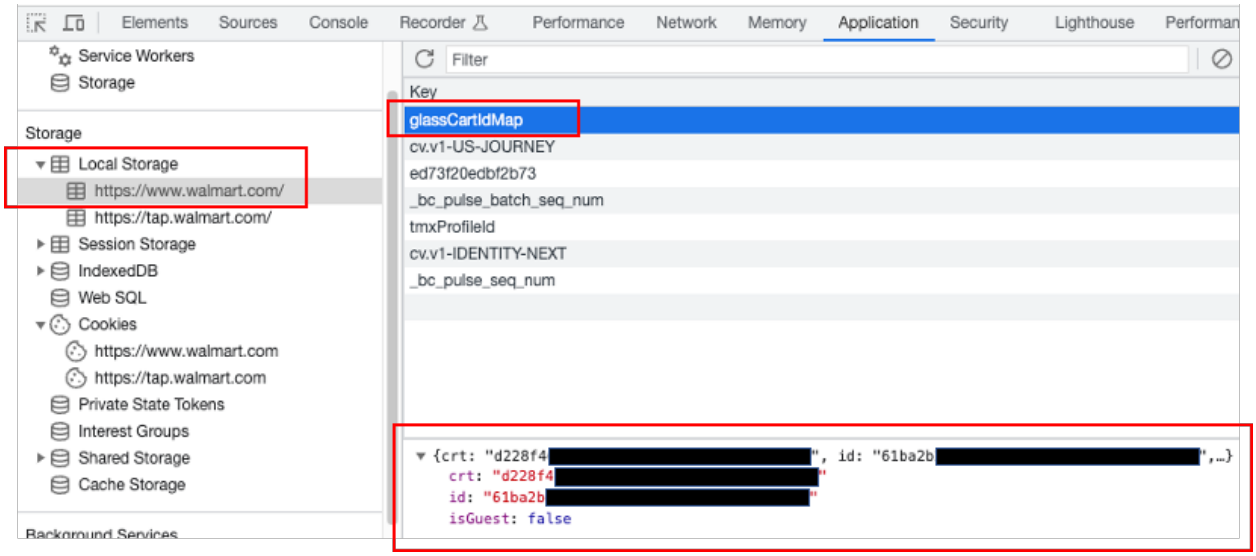




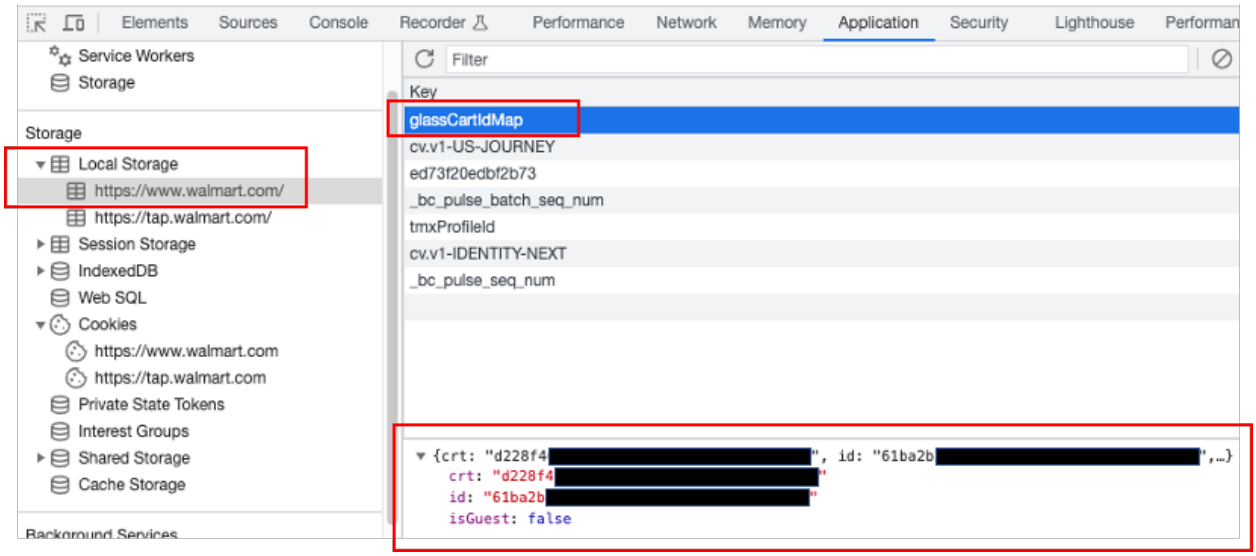
48. When the user is recognized through information present in the CID cookie by the Walmart System's servers, the user will see their name displayed instead of a sign-in page, as shown below:



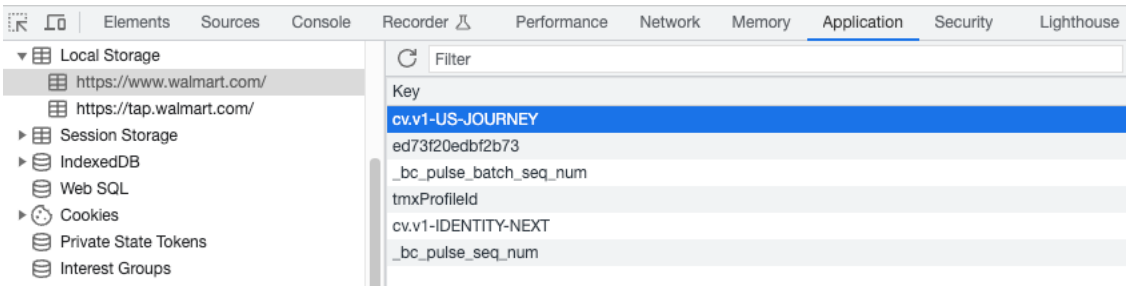
49. The Walmart System's one or more processors are configured to perform a second identification of at least one of the client devices and the user of the client device using the second cookie of the second type. For example, the Walmart System performs a second identification of at least one of the client devices and a user of the client device using the previously stored glassCartIdMap local storage cookie. The glassCartIdMap cookie is tied to and can be used to identify the user because it contains the user's ID. Walmart associates a glassCartIdMap cookie with at least one of the client devices and a user of the client device with an email and password sign-in process as its "ID" field contains the same customer ID as the CID cookie ("61ba2b…" in the screenshot below).



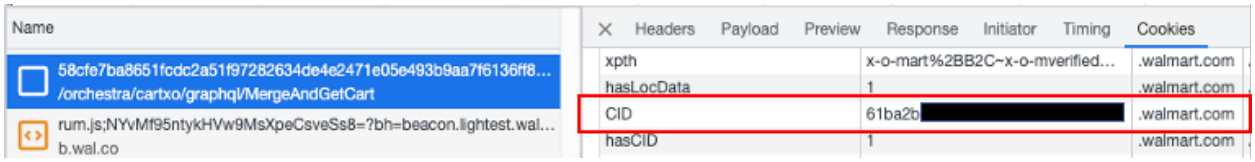
50. The Walmart System's one or more processors are configured to perform a determination based at least in part on (1) a presence of a network resource request associated with one of the first cookie and the second cookie, and (2) an absence of a network resource request associated with the other of the first cookie and the second cookie. For example, if a user attempts to view their cart, Walmart determines whether the user can view the items in their cart due to the presence of the CID cookie (the first cookie) and the absence of the glassCartIdMap cookie (the second cookie). If Walmart finds the CID cookie but does not find the glassCartIdMap cookie, Walmart will allow the user to view their cart page without signing in again but will re-download data to create the glassCartIdMap cookie. For example, in the screenshots below, the glassCartIdMap cookie is removed to cause it to be absent, which causes the glassCartIdMap cookie to be downloaded again to recreate the user's cart information. In the screenshot below, the glassCartIdMap cookie is present in local storage:



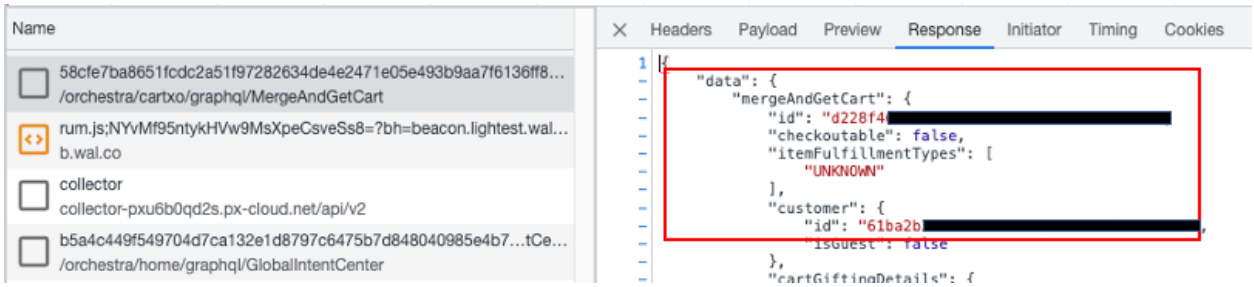
51. In the screenshot below, the glassCartIdMap cookie has been removed from local storage:



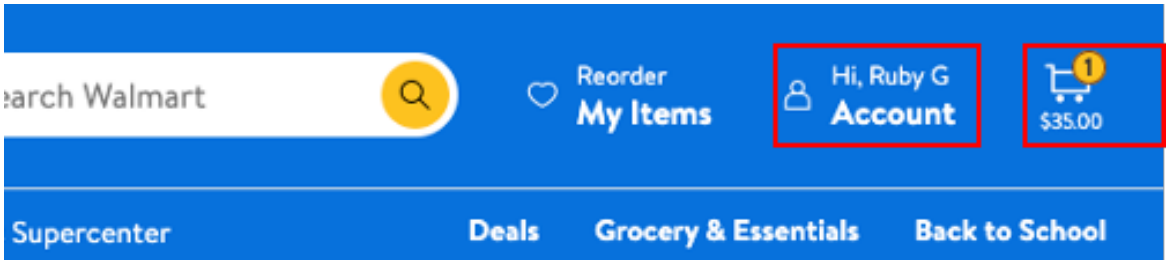
52. When the glassCartIdMap cookie is absent from local storage, the Walmart System will re-create the glassCartIdMap cookie during a new network request. The Walmart System uses the CID cookie as one input in order to re-create the glassCartIdMap cookie. The screenshot below shows the CID cookie's customer ID, 61ba2b.



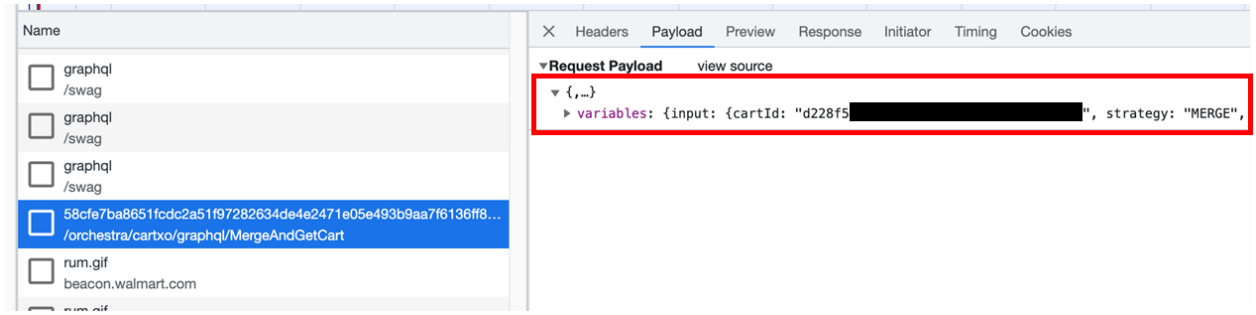
53. The Walmart System re-creates the glassCartIdMap cookie with the same customer ID, 61ba2b, as shown in the screenshot below:

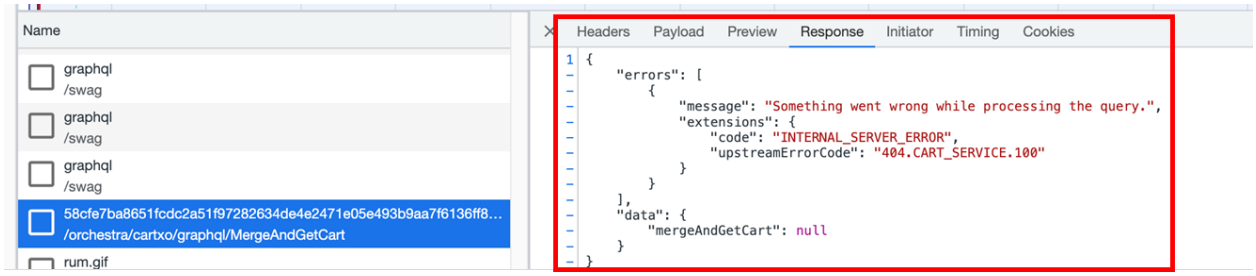


54. In the same example, within the user interface, the cart appears with the items that were present:

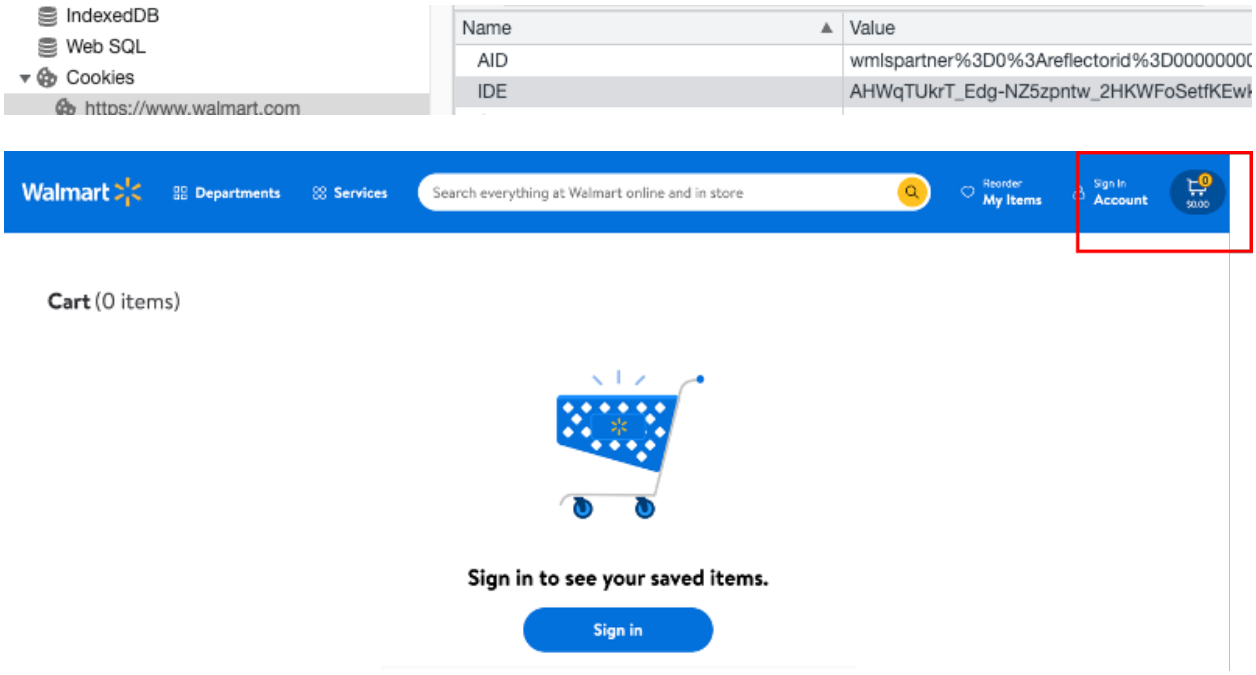


55. The cart id (crt field of glassCartIdMap) is linked to the ability to download cart contents. For example, if the crt field is incorrect (in the example below, changing crt from "d228f4…" to "d228f5…," the client is unable to use the glassCartIdMap crt identifier to load the cart. Instead, the client receives an error and no cart data, as shown in the screenshots below:





56. In contrast, if the Walmart System's one or more processors do not find the CID cookie, the Walmart System's servers will not allow the user to view their cart. For example, if the CID cookie is removed, a user attempting to view their cart will be met with only a request to sign in:



57. The Walmart System comprises memory coupled to the Walmart System's one or more processors and configured to provide the one or more processors with instructions. For example, the Walmart System employs Envoy on its web servers, which requires memory coupled to the one or more processors and configured to provide the one or more processors with instructions. Walmart's site information confirms the Walmart' System's use of Envoy:

Site Info - Walmart.com

Overview of web technologies used by Walmart.com.

Website Background	
Description on Homepage	Walmart.com | Save Money. Live Better Shop Walmart.com today for Every Day Low Prices. Join Walmart+ for unlimited free delivery from your store & free shipping with no order minimum. Start your free 30-day trial now!
Popularity rank	Top 1k among all websites

Website Quality Alerts	
No title declaration	Found on page https://www.walmart.com/store-finder There is no title defined for the web page.
	Are you the webmaster of this site? Register as user to get quality alerts per email.

Content Management System	
Brightspot used on a subdomain	Brightspot is a content management system written in Java by Perfect Sense.

Server-side Programming Languages	
ASP.NET used on a subdomain	Microsoft's Active Server Pages technology on the .NET framework.
Java used on a subdomain	Java is a general-purpose language originally developed by Sun Microsystems.

Client-side Programming Language	
JavaScript	JavaScript is a lightweight, object-oriented, cross-platform scripting language, often used within web pages.

Web Servers	
Envoy	Envoy Proxy is a proxy server designed for large service-oriented architectures.

Site Info - Walmart.com, W3Techs, https://w3techs.com/sites/info/walmart.com.

COUNT II

(Walmart's Infringement of U.S. Patent No. 11,562,402)

58. RavenWhite incorporates by reference and re-alleges the foregoing paragraphs as if fully set forth herein.

59. Walmart Connect is an advertising platform and service provided by Walmart. Walmart has infringed and continues to infringe the '402 Patent through its operation of Walmart Connect.

60. Claim 19 of the ’402 Patent, for example, reads as follows:

> A computer program product embodied in a non-transitory computer readable storage medium and comprising computer instructions for:
>
> determining a first quality level associated with a user profile, wherein the first quality level is based at least in part on an estimate of a likelihood of an event, wherein the first quality level is determined based at least in part on at least on of: (1) a first search associated with the user profile or (2) a first purchase associated with the user profile, and wherein the determining of the first quality level is based at least in part on a unique identifier and clustering;
>
> determining, for a user associated with the user profile, an indication of interest in a first category, wherein the indication of interest in the first category is determined based at least in part on at least one of: (1) a second search associated with the user profile or (2) a second purchase associated with the user profile;
>
> storing, in a record associated with the user, the indication of interest in the first category;
>
> subsequent to determining the indication of interest in the first category, determining, for the user, that a need relative to the first category has been met based at least in part on at least one of: (1) a third search associated with the user profile or (2) a third purchase associated with the user profile;
>
> based at least in part on the determination that the need relative to the first category has been met, determining an indication of interest in a second category, wherein the indication of interest in the first category and the indication of interest in the second category comprise a sequence of related indications of interest;
>
> in response to determining that the need relative to the first category has been met, determining a second quality level associated with the user, wherein the second quality level is determined with respect to the first category;
>
> wherein at least one of the first quality level or the second quality level is based at least in part on a conversion assessment associated with the user profile, and wherein the conversion assessment is based at least in part on historical click behavior; and
>
> displaying an advertisement to the user based at least in part on the at least one of the first quality level or the second quality level.

‘402 Patent, 20:3-49 (claim 19).

61. Walmart has directly infringed, and continues to directly infringe, one or more claims of the ’402 Patent, including at least claim 19 of the ’402 Patent, literally and/or under the

doctrine of equivalents, by or through making, using, offering for sale, selling within the United States and/or importing Walmart Connect. The following paragraphs demonstrate how Walmart makes, uses and/or sells a computer program product embodied in a computer readable storage medium that includes instructions that perform each of the limitations of claim 19 of the '402 Patent with Walmart Connect.

62. Walmart makes, uses and/or sells a computer product embodied in a computer readable storage medium. For example, Walmart's website and applications, including Walmart Connect, are created, used, sold and/or stored on non-transitory storage media on Walmart's servers. Walmart Connect uses a second-price auction for Walmart Search advertising:

SEARCH

Walmart Connect

Advanced second-price auction for Walmart Search advertising

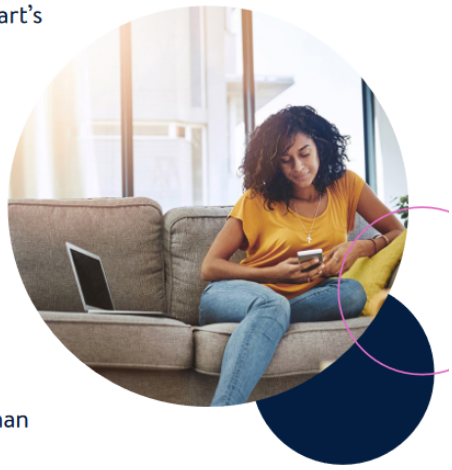
A new auction model for **Sponsored Products** and **Search Brand Amplifier** helps give advertisers the confidence to **bid their best,** with a reduced risk of overpaying.

How it works

When a customer searches for a product on Walmart's site or app, the platform runs a **real-time auction** to determine which ads will appear along with the search results, and in what placements.

To choose the winner of each ad placement, the platform first determines which competing ads are relevant. It awards the placement to the **most relevant ad** and establishes the **cost-per-click** price after considering the bids of the other relevant ads.

The auction winner pays **the amount necessary** to win based on competing bids, which may be less than their maximum bid.



Advanced Second-Price Auction for Walmart Search Advertising, WalmartConnect (2022), https://www.walmartconnect.com/content/dam/wmg/documents/insight-articles/2022/2pa-blog-

post/Advanced-second-price-auction-guide.pdf [hereinafter Advanced Second-Price Auction Guide].

63. Walmart determines a first quality level associated with a user profile, wherein the first quality level is based at least in part on an estimate of a likelihood of an event, wherein the first quality level is determined based at least in part on at least one of: (1) a first search associated with the user profile or (2) a first purchase associated with the user profile, and wherein the determining of the first quality level is based at least in part on a unique identifier and clustering.

64. Walmart determines a first quality level, such as, for example, a relevancy score for a user. The first quality level is based at least in part on an estimate of a likelihood of an event, such as the likelihood of a user click event. For example, Walmart Sponsored products are shown to users "based on the product's relevancy and cost-per-click (CPC) bid price":

> How and when do Sponsored Products ads appear?
>
> Walmart's algorithm serves Sponsored Products ads based on the product's relevancy and the cost-per-click (CPC) bid price. To determine relevancy the algorithm looks at qualities such as product title and description, click frequency and product category.

A Beginner's Guide to Walmart Sponsored Products, WalmartConnect, (January 23, 2020), https://www.walmartconnect.com/a-beginner-s-guide-to-walmart-sponsored-products [hereinafter Walmart Sponsored Products Guide].

65. The following example shows how a second-price auction works:

Here is an example in which there are only three bidders in the auction:

Advertiser A:

- Relevancy Score: 98%
- Bid: $4.50

Advertiser B:

- Relevancy Score 60%
- Bid: $5.00

Advertiser C:

- Relevancy Score: 80%
- Bid: $3.00

Despite having the highest bid, Advertiser B isn't as relevant to the search term as A or C. Given that Advertiser A has the next highest bid and is also the most relevant, Advertiser A is the auction winner. Advertiser A will end up paying somewhere between $3 and $4.50, this amount will be determined by Walmart's algorithms.

Meghna Bhalla & Tiffany Luk, *Walmart Keyword Bidding: Second Price Auction*, Perpetua (May 31, 2022), https://perpetua.io/blog-walmart-keyword-bidding-second-price-auction/ [hereinafter Walmart Keyword Bidding].

66. With Walmart Connect's second-price auction, the first quality level (ad relevancy) is determined based at least in part on a first search associated with the user profile or a first purchase associated with the user profile:

What Personal Information Do We Collect?

We may collect or receive the categories of personal information listed below, which may depend on the products or services you may use, as well as your device and account settings. Not all categories of personal information will be collected or received about every individual.

- **Basic Personal Identifiers**, such as name, telephone number, physical address, email address, government-issued identifiers (e.g., national identification numbers, driver's license numbers), and signatures
- **Device and Online Identifiers**, such as account login information, Mac address, IP address, cookie IDs, mobile ad IDs, and social media information
- **Internet and Other Network Activity Information**, such as information about your browsing or search activity as well as your interactions with our websites, mobile applications, emails, or advertisements such as keystroke patterns (these tell us if it's you who is interacting with us, or a bot)
- **Commercial Information**, such as purchase and transaction history information (such as products or services you have purchased, rented, or returned), product reviews, travel and vacation information, and sweepstakes and contest entries

Walmart Privacy Notice, https://corporate.walmart.com/privacy-security/walmart-privacy-notice.

67. Walmart uses a user's search and purchase history to provide advertising and count ad impressions:

How Do We Use Your Personal Information?

We use your personal information to provide you with products and services and to operate and improve our business. For example, we use it for:

- Performing services, including maintaining or servicing accounts, providing customer service, processing or fulfilling orders and transactions, verifying customer information, processing payments, providing financing, providing analytics services, providing storage, or providing similar services
- Performing and providing advertising and marketing services, including targeted advertising
- To conduct auditing and monitoring of transactions and engagement, including auditing related to counting ad impressions to unique visitors, verifying positioning and quality of ad impressions, and auditing compliance
- Short-term, transient use, such as non-personalized advertising shown as part of your current interaction with us
- Helping to ensure security and integrity and prevent fraud
- Undertaking activities to verify or maintain the quality or safety of our services or devices and to improve, upgrade, or enhance them
- Debugging to identify and repair errors
- Conducting business analysis, such as analytics, projections, identifying areas for operational improvement
- Conducting research and development, including undertaking internal research for technological development and demonstration
- Fulfilling our legal functions or obligations

Walmart Privacy Notice, https://corporate.walmart.com/privacy-security/walmart-privacy-notice.

68. Walmart performs the step of determining the first quality level based at least in part on a unique identifier. For example, Walmart keeps track of users through identifiers including, but not limited to "device and online identifiers":

We may collect or receive (and may have collected or received during the 12-month period prior to the Last Updated date of this California Notice) the categories of personal information listed below. Not all categories will be collected or received for every individual.

- **Identifiers:** Personal identifiers, such as name, telephone number, physical address, email address, national identification numbers, driver's license numbers, and signatures
- **Device Information and Online Activity:** Device and online identifiers, keystroke patterns indicative of human or bot website/app usage, mobile and web network activity and related information (such as Mac address, IP address, cookie IDs, browser activity, and other information associated with your browsing history), and social media information
- **Commercial Information:** Purchase and transaction history information (such as products or services you have purchased, rented, or returned), health and safety-related information, product testimonials, travel and vacation information, and competition entries

Walmart CCPA Notice, https://corporate.walmart.com/privacy-security/california-privacy-rights.

69. As further examples, Walmart also keeps track of users through identifiers including, but not limited to, financial information, biometric information, geolocation, background information, and inferences:

- **Communications:** Communication details (such as the content of emails, text messages, or other communications), call logs, and calendar information, where Walmart is a party to the exchange
- **Demographic Information**, such as age, gender, citizenship, ethnicity, date of birth, family or marital status, household income, education, professional and employment information, family health, number of children, number of cars owned, and software or virtual assets owned
- **Financial Information,** such as credit or debit card numbers, and financial account numbers
- **Biometric Information**, such as voice prints, imagery of the iris or retina, face geometry, and palm prints or fingerprints
- **Geolocation:** Data about the location of your device, which may be imprecise (i.e. inferred from your device's IP address). If you provide your consent, this data may be precise. For more information about precise geolocation, see the *How Do We Collect Personal Information? > Collected Through Automated Means* section below.
- **Sensory Information:** Audio, visual information, and other sensory information such as photographs and audio and video recordings
- **Background Information:** Background and criminal information, such as background checks and criminal convictions
- **Inferences:** Individual preferences and characteristics, such as inferences drawn from and related to shopping patterns and behaviors, intelligence, and aptitudes

Walmart Privacy Notice, https://corporate.walmart.com/privacy-security/walmart-privacy-notice.

70. Walmart publishes the recommendation algorithms it uses on its data in, for example, the Association for Computing Machinery (ACM):

An Efficient Group-based Search Engine Marketing System for E-Commerce

Cheng Jie, Da Xu, Zigeng Wang, Lu Wang, Wei Shen
Walmart Labs
Sunnyvale, California, USA
{cheng.jie,da.xu,zigeng.wang0,lu.wang3,wei.shen}@walmart.com

…

> both the offline and online serving. In this paper, we introduce the development and deployment process of the bidding system for search engine marketing on Walmart.com, which successfully handles hundreds of millions of biddings each day. We show and discuss the real-world performances of state-of-the-art deep learning methods, and reveal how we find their as the production-optimal solutions.
>
> …
>
> **SEM bidding through clustering ads intentions**
>
> In this paper, we introduce a generic bidding framework targeting the above challenges. The SEM solution proposed in our paper is currently in production for the multi-million-scale ads bidding for Walmart's e-commerce business. As we

Cheng Jie, Da Xu, Zigeng Wang, Lu Wang, & Wei Shen, *An Efficient Group-based Search Engine Marketing System for E-Commerce*, in Proceedings of ACM Conference (Conference '17) 8 pages, ACM, New York, NY, USA, (2021), https://doi.org/10.1145/1122445.1122456, available at https://arxiv.org/abs/2106.12700 [hereinafter Jie Paper].

71. Walmart uses cookies, device and online identifiers for user profiles and applies clustering algorithms to estimate user intent (and therefore ad relevancy) for search engine marketing (SEM):

> **3.1 Customer intention embedding model**
>
> In this section, we walk through the key component of the customer intention embedding model. Customer intention of an SEM ad is defined as the integrated purchase intention of the set of search queries leading to clicks of the ad's web page on search engine. For example, an ad has drawn clicks of customers after searching queries like "apple phone 8 case" or "iphone 9 case" has customer intention be case covers for various versions of iphone. If two ads share a large portion of clicked search queries, their customer intentions should be close to each other by definition. Therefore, customer intention model is designed to reflect the co-click relationships among the SEM ads.

Jie Paper at 4. The following except from the Jie Paper describes SEM ads classification:

SEM ads classification. The first step of the multi-stage clustering algorithm is to classify each SEM ad into one of the *product types*, which can be any taxonomy that is labeled for the items: electronics, beverage, etc. Most companies have the predefined taxonomy for each item, which should be actively exploited. SEM ad with only one item can be directly concluded to its product type, and serve as the training sample of the taxonomy classification model. For SEM ads with more than one item, we train a feedforward neural network[5] to predict each ads' product type, which takes the embedding of the SEM ad as input.

Jie Paper at 5.

72. Walmart determines, for a user associated with the user profile, an indication of interest in a first category, wherein the indication of interest in the first category is determined based at least in part on at least one of: (1) a second search associated with the user profile or (2) a second purchase associated with the user profile. For example, Walmart determines customer intent (an indication of interest in a category) to determine which ads will appear along with search results:

How Walmart determines ad relevancy

When a customer searches Walmart's site or app, the platform runs a real-time auction to determine which ads will appear along with the search results, and in what placements.

The platform considers factors including how closely the advertised product matches the customer's intent, the ad's contextual relevancy, the quality of item page content and the product's historical performance at Walmart.

Best Practices Guide: Optimizing the Relevancy of your Walmart Sponsored Products ads, (2022), https://www.walmartconnect.com/content/dam/wmg/documents/insight-articles/2022/sre-best-practices/FY23-Q2-SRE-Best-Practices-Guide.pdf [hereinafter Best Practices Guide]. Customer intent is designed to reflect relationships among SEM ads:

3.1 Customer intention embedding model

In this section, we walk through the key component of the customer intention embedding model. Customer intention of an SEM ad is defined as the integrated purchase intention of the set of search queries leading to clicks of the ad's web page on search engine. For example, an ad has drawn clicks of customers after searching queries like "apple phone 8 case" or "iphone 9 case" has customer intention be case covers for various versions of iphone. If two ads share a large portion of clicked search queries, their customer intentions should be close to each other by definition. Therefore, customer intention model is designed to reflect the co-click relationships among the SEM ads.

Jie Paper at 4.

73. The user's indication of interest is calculated with regards to a particular category:

How and when do Sponsored Products ads appear?

Walmart's algorithm serves Sponsored Products ads based on the product's relevancy and the cost-per-click (CPC) bid price. To determine relevancy the algorithm looks at qualities such as product title and description, click frequency and product category.

Walmart Sponsored Products Guide, https://www.walmartconnect.com/a-beginner-s-guide-to-walmart-sponsored-products.

74. Walmart uses a taxonomy to place ads into categories for search engine marketing:

SEM ads classification. The first step of the multi-stage clustering algorithm is to classify each SEM ad into one of the *product types*, which can be any taxonomy that is labeled for the items: electronics, beverage, etc. Most companies have the predefined taxonomy for each item, which should be actively exploited. SEM ad with only one item can be directly concluded to its product type, and serve as the training sample of the taxonomy classification model. For SEM ads with more than one item, we train a feedforward neural network[5] to predict each ads' product type, which takes the embedding of the SEM ad as input.

Jie Paper at 5.

75. Walmart's determination of customer intent is based on at least in part the user's search history (a second search associated with the user profile) and purchase history (a second purchase associated with the user profile), among other things:

What Personal Information Do We Collect?

We may collect or receive the categories of personal information listed below, which may depend on the products or services you may use, as well as your device and account settings. Not all categories of personal information will be collected or received about every individual.

- **Basic Personal Identifiers**, such as name, telephone number, physical address, email address, government-issued identifiers (e.g., national identification numbers, driver's license numbers), and signatures
- **Device and Online Identifiers**, such as account login information, Mac address, IP address, cookie IDs, mobile ad IDs, and social media information
- **Internet and Other Network Activity Information**, such as information about your browsing or search activity as well as your interactions with our websites, mobile applications, emails, or advertisements such as keystroke patterns (these tell us if it's you who is interacting with us, or a bot)
- **Commercial Information**, such as purchase and transaction history information (such as products or services you have purchased, rented, or returned), product reviews, travel and vacation information, and sweepstakes and contest entries

Walmart Privacy Notice, https://corporate.walmart.com/privacy-security/walmart-privacy-notice.

76. For example, Walmart describes that it uses a user's search and purchase history to provide advertising and count ad impressions:

How Do We Use Your Personal Information?

We use your personal information to provide you with products and services and to operate and improve our business. For example, we use it for:

- Performing services, including maintaining or servicing accounts, providing customer service, processing or fulfilling orders and transactions, verifying customer information, processing payments, providing financing, providing analytics services, providing storage, or providing similar services
- Performing and providing advertising and marketing services, including targeted advertising
- To conduct auditing and monitoring of transactions and engagement, including auditing related to counting ad impressions to unique visitors, verifying positioning and quality of ad impressions, and auditing compliance
- Short-term, transient use, such as non-personalized advertising shown as part of your current interaction with us
- Helping to ensure security and integrity and prevent fraud
- Undertaking activities to verify or maintain the quality or safety of our services or devices and to improve, upgrade, or enhance them
- Debugging to identify and repair errors
- Conducting business analysis, such as analytics, projections, identifying areas for operational improvement
- Conducting research and development, including undertaking internal research for technological development and demonstration
- Fulfilling our legal functions or obligations

Walmart Privacy Notice, https://corporate.walmart.com/privacy-security/walmart-privacy-notice.

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How Do We Use Your Personal Information?

We use your personal information to provide you with products and services and to operate and improve our business. For example, we use it for:

- Performing services, including maintaining or servicing accounts, providing customer service, processing or fulfilling orders and transactions, verifying customer information, processing payments, providing financing, providing analytics services, providing storage, or providing similar services
- Performing and providing advertising and marketing services, including targeted advertising
- To conduct auditing and monitoring of transactions and engagement, including auditing related to counting ad impressions to unique visitors, verifying positioning and quality of ad impressions, and auditing compliance
- Short-term, transient use, such as non-personalized advertising shown as part of your current interaction with us
- Helping to ensure security and integrity and prevent fraud
- Undertaking activities to verify or maintain the quality or safety of our services or devices and to improve, upgrade, or enhance them
- Debugging to identify and repair errors
- Conducting business analysis, such as analytics, projections, identifying areas for operational improvement
- Conducting research and development, including undertaking internal research for technological development and demonstration
- Fulfilling our legal functions or obligations

Walmart Privacy Notice, https://corporate.walmart.com/privacy-security/walmart-privacy-notice.

78. Walmart stores, in a record associated with the user, the indication of interest in the first category. For example, Walmart saves indications of interest in a first category through the user's browsing history, search activity, interaction with Walmart's website, keystroke patterns, purchase history, reviews, travel and vacation information, and sweepstakes and contest entries.

What Personal Information Do We Collect?

We may collect or receive the categories of personal information listed below, which may depend on the products or services you may use, as well as your device and account settings. Not all categories of personal information will be collected or received about every individual.

- **Basic Personal Identifiers**, such as name, telephone number, physical address, email address, government-issued identifiers (e.g., national identification numbers, driver's license numbers), and signatures
- **Device and Online Identifiers**, such as account login information, Mac address, IP address, cookie IDs, mobile ad IDs, and social media information
- **Internet and Other Network Activity Information**, such as information about your browsing or search activity as well as your interactions with our websites, mobile applications, emails, or advertisements such as keystroke patterns (these tell us if it's you who is interacting with us, or a bot)
- **Commercial Information**, such as purchase and transaction history information (such as products or services you have purchased, rented, or returned), product reviews, travel and vacation information, and sweepstakes and contest entries

Walmart Privacy Notice, https://corporate.walmart.com/privacy-security/walmart-privacy-notice.

79. The Jie Paper also describes that Walmart stores a user's indication of interest in a category, such as, for example, storing "the set of search queries leading to clicks of the ad's web page on search engine." Other users' queries are stored in order to be compared against the instant user's searches:

3.1 Customer intention embedding model

In this section, we walk through the key component of the customer intention embedding model. Customer intention of an SEM ad is defined as the integrated purchase intention of the set of search queries leading to clicks of the ad's web page on search engine. For example, an ad has drawn clicks of customers after searching queries like "apple phone 8 case" or "iphone 9 case" has customer intention be case covers for various versions of iphone. If two ads share a large portion of clicked search queries, their customer intentions should be close to each other by definition. Therefore, customer intention model is designed to reflect the co-click relationships among the SEM ads.

Jie Paper at 4.

80. Walmart, subsequent to determining the indication of interest in the first category, determines, for the user, that a need relative to the first category has been met based at least in part on at least one of: (1) a third search associated with the user profile or (2) a third purchase associated with the user profile. For example, Walmart determines a need relative to the first category has been met as part of optimizing ad placements, taking into customer intent, including "search queries leading to clicks on an ad's web page" and the user's search and purchase history:

> **3.1 Customer intention embedding model**
>
> In this section, we walk through the key component of the customer intention embedding model. Customer intention of an SEM ad is defined as the integrated purchase intention of the set of search queries leading to clicks of the ad's web page on search engine. For example, an ad has drawn clicks of customers after searching queries like "apple phone 8 case" or "iphone 9 case" has customer intention be case covers for various versions of iphone. If two ads share a large portion of clicked search queries, their customer intentions should be close to each other by definition. Therefore, customer intention model is designed to reflect the co-click relationships among the SEM ads.

Jie Paper at 4. Walmart also collects information unique to each user:

What Personal Information Do We Collect?

We may collect or receive the categories of personal information listed below, which may depend on the products or services you may use, as well as your device and account settings. Not all categories of personal information will be collected or received about every individual.

- **Basic Personal Identifiers**, such as name, telephone number, physical address, email address, government-issued identifiers (e.g., national identification numbers, driver's license numbers), and signatures
- **Device and Online Identifiers,** such as account login information, Mac address, IP address, cookie IDs, mobile ad IDs, and social media information
- **Internet and Other Network Activity Information**, such as information about your browsing or search activity as well as your interactions with our websites, mobile applications, emails, or advertisements such as keystroke patterns (these tell us if it's you who is interacting with us, or a bot)
- **Commercial Information**, such as purchase and transaction history information (such as products or services you have purchased, rented, or returned), product reviews, travel and vacation information, and sweepstakes and contest entries

Walmart Privacy Notice, https://corporate.walmart.com/privacy-security/walmart-privacy-notice.

81. As another example, Walmart describes determining that a need relative to a first category has been met based on search or transaction history in order to recommend a next item in its U.S. Patent No. 10,783,550 ("the '550 Patent"):

> Models for Ranking Products
>
> The approach to rank the products which are to be shown on a given page type in a given format for a given customer depends on several qualitative and quantitative attributes: bid price b: the cost per click for the advertiser; CTR: the unbiased estimate of click through rate for a given ad on a given landing page; customer profile C: a set of attributes which depend on the customer's past viewing history and purchase history, which can act as a penalty/boost for an advertisement's rank; and probability p is the conversion probability previously described.

'550 Patent at 9:55-65.

Personalization

The retailer performance ad ranking is based on contextual matching but an added degree of personalization can help optimize better for performance. Personalization of ads for an individual customer is critical on low-context website pages like home and category pages. The generic nature of these website pages makes it necessary to show ads related to users browsing and purchase history. For other website

'550 Patent at 11:64-12:4.

82. For example, Walmart explicitly calls out a "second probability that the consumer will click on the product" (that is, that a need relative to the first category has been met) using a user's viewing and purchase history;

optimize with the optimization system an estimated online revenue and an estimated online advertisement spending, wherein the estimated online revenue is a function of at least the conversion probability estimation and an online advertisement rank position for the on online advertisement on the website, wherein the estimated online advertising spending is a function of at least the CTR and the consumer data, wherein a second probability that the consumer will click on the product on the website of the retailer is based on a logistic regression model, wherein training the logistic regression model comprises, for each respective online advertisement for the product displayed on the website, using input data comprising the purchase history and the viewing history associated with the consumer,

'550 Patent at 16:50-64.

83. Walmart, based at least in part on the determination that the need relative to the first category has been met, determines an indication of interest in a second category, wherein the indication of interest in the first category and the indication of interest in the second category comprise a sequence of related indications of interest. For example, Walmart determines an indication of interest in a second category, wherein the indication of interest in the first category and the indication of interest in the second category comprise a sequence of related indications of

interest using customer intent, including using a set of search queries such as searches for "apple phone 8 case" or "iphone 9 case." The user's interest in a second category is related to the first indication of interest because Walmart describes tracking "the set of search queries leading to clicks":

> **3.1 Customer intention embedding model**
>
> In this section, we walk through the key component of the customer intention embedding model. Customer intention of an SEM ad is defined as the integrated purchase intention of the set of search queries leading to clicks of the ad's web page on search engine. For example, an ad has drawn clicks of customers after searching queries like "apple phone 8 case" or "iphone 9 case" has customer intention be case covers for various versions of iphone. If two ads share a large portion of clicked search queries, their customer intentions should be close to each other by definition. Therefore, customer intention model is designed to reflect the co-click relationships among the SEM ads.

Jie Paper at 4. The Walmart Connect platform performs a real-time auction to determine which ads appear:

> **How Walmart determines ad relevancy**
>
> When a customer searches Walmart's site or app, the platform runs a real-time auction to determine which ads will appear along with the search results, and in what placements.
>
> The platform considers factors including how closely the advertised product matches the customer's intent, the ad's contextual relevancy, the quality of item page content and the product's historical performance at Walmart.

Best Practices Guide, https://www.walmartconnect.com/content/dam/wmg/documents/insight-articles/2022/sre-best-practices/FY23-Q2-SRE-Best-Practices-Guide.pdf. The Walmart California Consumer Privacy Act Notice, updated January 1, 2023, also confirms that Walmart collects personal and unique information for each user. *See* Walmart CCPA Notice, https://corporate.walmart.com/privacy-security/california-privacy-rights.

84. As another example, Walmart determines when a user's need have been met and suggests additional products before checkout. For example, Walmart analyzes users' online activity including the items in their shopping baskets with "multi-level cobought models," which allows Walmart to first "recommend items for each of the purposes." Next, Walmart upon determining that the user's need has been met, Walmart additionally offers users "a series of items at checkout." The following excerpt describe how Walmart personalizes the shopping experience:

Abstract

Food is so personal. Each individual has her own shopping characteristics. In this paper, we introduce personalization for Walmart online grocery. Our contribution is twofold. First, we study shopping behaviors of Walmart online grocery customers. In contrast to traditional online shopping, grocery shopping demonstrates more repeated and frequent purchases with large orders. Secondly, we present a multi-level basket recommendation system. In this system, unlike typical recommender systems which usually concentrate on single item or bundle recommendations, we analyze a customer's shopping basket holistically to understand her shopping tasks. We then use multi-level cobought models to recommend items for each of the purposes. At the stage of selecting particular items, we incorporate both the customers' general and subtle preferences into decisions. We finally recommend the customer a series of items at checkout. Offline experiments show our system can reach 11 % item hit rate, 40 % subcategory hit rate and 70 % category hit rate. Online tests show it can reach more than 25 % order hit rate.

Mengdie Yuan, Yannis Pavlidis, Mridul Jain & Kevin Caster, *Walmart Online Grocery Personalization: Behavioral Insights and Basket Recommendations*, in Advances in Conceptual Modeling. ER 2016, Lecture Notes in Computer Science, vol. 9975, (S. Link & J. Trujillo eds., 2016), https://doi.org/10.1007/978-3-319-47717-6_5 [hereinafter Walmart Online Grocery Personalization].

85. As further evidence of how Walmart Connect operates, in the '550 Patent, Walmart explicitly calls out a "second probability that the consumer will click on the product," which is determining an indication of interest in a second category:

> optimize with the optimization system an estimated online revenue and an estimated online advertisement spending, wherein the estimated online revenue is a function of at least the conversion probability estimation and an online advertisement rank position for the on online advertisement on the website, wherein the estimated online advertising spending is a function of at least the CTR and the consumer data, wherein a second probability that the consumer will click on the product on the website of the retailer is based on a logistic regression model, wherein training the logistic regression model comprises, for each respective online advertisement for the product displayed on the website, using input data comprising the purchase history and the viewing history associated with the consumer,

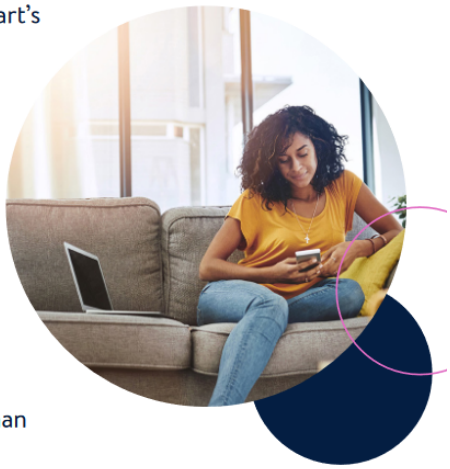
'550 Patent at 16:50-64.

86. Walmart, in response to determining that the need relative to the first category has been met, determines a second quality level associated with the user, wherein the second quality level is determined with respect to the first category. For example, Walmart determines a second quality level associated with the user considering a need relative to a first category has been met using "the customer's intent," which includes product category and purchase history. This is used to determine a second quality level to respond to further searches to determine relevancy, including a relevancy score:

When a customer searches for a product on Walmart's site or app, the platform runs a **real-time auction** to determine which ads will appear along with the search results, and in what placements.

To choose the winner of each ad placement, the platform first determines which competing ads are relevant. It awards the placement to the **most relevant ad** and establishes the **cost-per-click** price after considering the bids of the other relevant ads.

The auction winner pays **the amount necessary** to win based on competing bids, which may be less than their maximum bid.



Advanced Second-Price Auction Guide,

https://www.walmartconnect.com/content/dam/wmg/documents/insight-articles/2022/2pa-blog-post/Advanced-second-price-auction-guide.pdf.

Walmart Connect serves ads for Sponsored Products based on relevancy:

How and when do Sponsored Products ads appear?

Walmart's algorithm serves Sponsored Products ads based on the product's relevancy and the cost-per-click (CPC) bid price. To determine relevancy the algorithm looks at qualities such as product title and description, click frequency and product category.

Walmart Sponsored Products Guide, https://www.walmartconnect.com/a-beginner-s-guide-to-walmart-sponsored-products.

87. The following describes how a Walmart Connect second-price auction would work with three bidders:

Here is an example in which there are only three bidders in the auction:

Advertiser A:

- Relevancy Score: 98%
- Bid: $4.50

Advertiser B:

- Relevancy Score 60%
- Bid: $5.00

Advertiser C:

- Relevancy Score: 80%
- Bid: $3.00

Despite having the highest bid, Advertiser B isn't as relevant to the search term as A or C. Given that Advertiser A has the next highest bid and is also the most relevant, Advertiser A is the auction winner. Advertiser A will end up paying somewhere between $3 and $4.50, this amount will be determined by Walmart's algorithms.

Walmart Keyword Bidding, https://perpetua.io/blog-walmart-keyword-bidding-second-price-auction/.

88. The excerpt below describes how Walmart determines ad relevancy:

How Walmart determines ad relevancy

When a customer searches Walmart's site or app, the platform runs a real-time auction to determine which ads will appear along with the search results, and in what placements.

The platform considers factors including how closely the advertised product matches the customer's intent, the ad's contextual relevancy, the quality of item page content and the product's historical performance at Walmart.

Best Practices Guide, https://www.walmartconnect.com/content/dam/wmg/documents/insight-articles/2022/sre-best-practices/FY23-Q2-SRE-Best-Practices-Guide.pdf.

89. Walmart describes that a second quality level is determined with respect to the first category, which is reflected in Walmart's recommendations of "a series of items at checkout" after the user selects initial items in the user's cart:

Abstract

Food is so personal. Each individual has her own shopping characteristics. In this paper, we introduce personalization for Walmart online grocery. Our contribution is twofold. First, we study shopping behaviors of Walmart online grocery customers. In contrast to traditional online shopping, grocery shopping demonstrates more repeated and frequent purchases with large orders. Secondly, we present a multi-level basket recommendation system. In this system, unlike typical recommender systems which usually concentrate on single item or bundle recommendations, we analyze a customer's shopping basket holistically to understand her shopping tasks. We then use multi-level cobought models to recommend items for each of the purposes. At the stage of selecting particular items, we incorporate both the customers' general and subtle preferences into decisions. We finally recommend the customer a series of items at checkout. Offline experiments show our system can reach 11 % item hit rate, 40 % subcategory hit rate and 70 % category hit rate. Online tests show it can reach more than 25 % order hit rate.

Walmart Online Grocery Personalization, https://doi.org/10.1007/978-3-319-47717-6_5.

90. In the '550 Patent, Walmart explicitly calls out a "second probability that the consumer will click on the product," which reflects a second quality level associated with the user:

> optimize with the optimization system an estimated online revenue and an estimated online advertisement spending, wherein the estimated online revenue is a function of at least the conversion probability estimation and an online advertisement rank position for the on online advertisement on the website, wherein the estimated online advertising spending is a function of at least the CTR and the consumer data, wherein a second probability that the consumer will click on the product on the website of the retailer is based on a logistic regression model, wherein training the logistic regression model comprises, for each respective online advertisement for the product displayed on the website, using input data comprising the purchase history and the viewing history associated with the consumer,

'550 Patent at 16:50-64.

91. Walmart bases at least one of the first quality level or the second quality level at least in part on a conversion assessment associated with the user profile, and wherein the

conversion assessment is based at least in part on historical click behavior. For example, Walmart's determination of relevancy scores is based at least in part on a product relevancy score associated with the user profile, which is based at least in part on a conversion assessment associated with the user profile, which is based at least in part on historical click behavior including the use of click frequency data:

> Keep your brand top of mind with Walmart customers
>
> With 16 million searches every day on Walmart.com, brands can take advantage of Sponsored Products to get customers to notice their brand, consider their offerings and act. This guide is designed to help advertisers create successful Walmart Sponsored Products campaigns and turn their ad dollars into business revenue.
>
> At Walmart, when we can connect our customers to the products they want through relevant ads, they win. And our advertisers win.

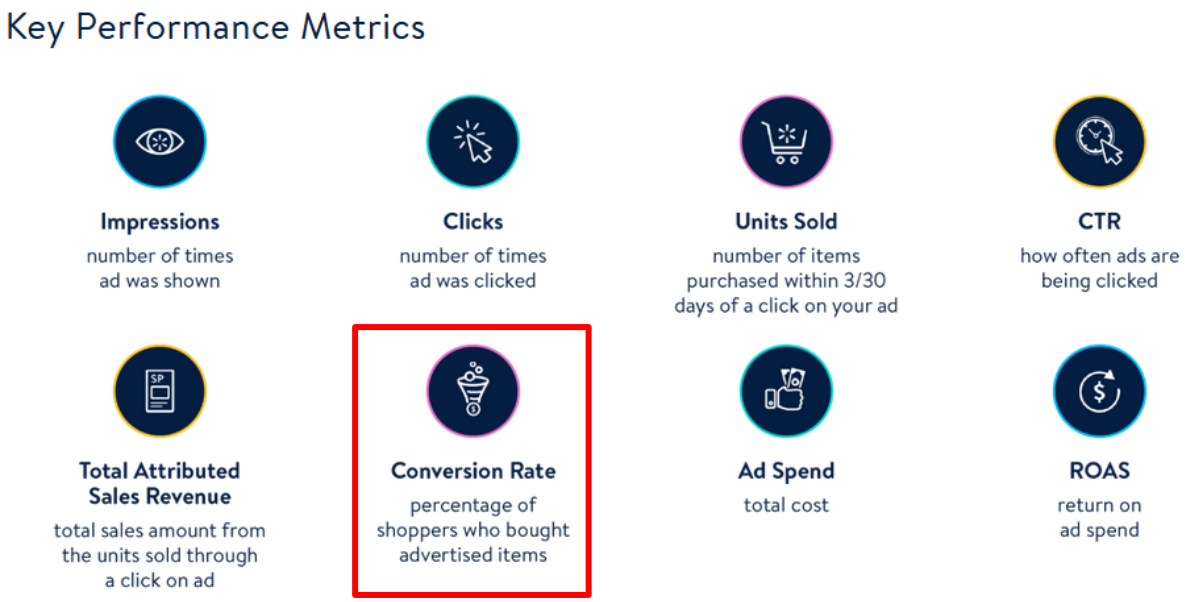
Walmart Sponsored Products Guide, https://www.walmartconnect.com/a-beginner-s-guide-to-walmart-sponsored-products.

92. Walmart serves ads for sponsored products based on the products' relevancy:

> How and when do Sponsored Products ads appear?
>
> Walmart's algorithm serves Sponsored Products ads based on the product's relevancy and the cost-per-click (CPC) bid price. To determine relevancy the algorithm looks at qualities such as product title and description, click frequency and product category.

Walmart Sponsored Products Guide, https://www.walmartconnect.com/a-beginner-s-guide-to-walmart-sponsored-products.

93. Walmart tracks various key performance metrics as follows:



Walmart Sponsored Products Guide, https://www.walmartconnect.com/a-beginner-s-guide-to-walmart-sponsored-products.

94. Walmart collects historical click behavior including through its tracking of device information and online activity. For example, Walmart keeps track of "browsing or search activity," "interactions with our websites…or advertisements such as keystroke patterns," and other information as shown in the following excerpts:

What Personal Information Do We Collect?

We may collect or receive the categories of personal information listed below, which may depend on the products or services you may use, as well as your device and account settings. Not all categories of personal information will be collected or received about every individual.

- **Basic Personal Identifiers**, such as name, telephone number, physical address, email address, government-issued identifiers (e.g., national identification numbers, driver's license numbers), and signatures
- **Device and Online Identifiers**, such as account login information, Mac address, IP address, cookie IDs, mobile ad IDs, and social media information
- **Internet and Other Network Activity Information**, such as information about your browsing or search activity as well as your interactions with our websites, mobile applications, emails, or advertisements such as keystroke patterns (these tell us if it's you who is interacting with us, or a bot)
- **Commercial Information**, such as purchase and transaction history information (such as products or services you have purchased, rented, or returned), product reviews, travel and vacation information, and sweepstakes and contest entries

Walmart Privacy Notice, https://corporate.walmart.com/privacy-security/walmart-privacy-notice.

We may collect or receive (and may have collected or received during the 12-month period prior to the Last Updated date of this California Notice) the categories of personal information listed below. Not all categories will be collected or received for every individual.

- **Identifiers:** Personal identifiers, such as name, telephone number, physical address, email address, national identification numbers, driver's license numbers, and signatures
- **Device Information and Online Activity:** Device and online identifiers, keystroke patterns indicative of human or bot website/app usage, mobile and web network activity and related information (such as Mac address, IP address, cookie IDs, browser activity, and other information associated with your browsing history), and social media information
- **Commercial Information:** Purchase and transaction history information (such as products or services you have purchased, rented, or returned), health and safety-related information, product testimonials, travel and vacation information, and competition entries

Walmart CCPA Notice, https://corporate.walmart.com/privacy-security/california-privacy-rights.

95. Walmart displays an advertisement to the user based at least in part on at least one of the first quality level or the second quality level. For example, Walmart displays an

advertisement to the user based on determining the winner of the real-time auction using ad relevance, which is based on either the first or second quality level:

SEARCH

Walmart Connect

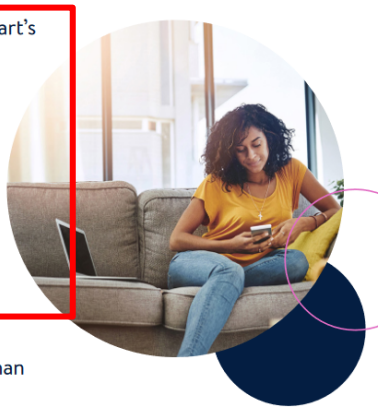
Advanced second-price auction for Walmart Search advertising

A new auction model for **Sponsored Products** and **Search Brand Amplifier** helps give advertisers the confidence to **bid their best,** with a reduced risk of overpaying.

How it works

When a customer searches for a product on Walmart's site or app, the platform runs a **real-time auction** to determine which ads will appear along with the search results, and in what placements.

To choose the winner of each ad placement, the platform first determines which competing ads are relevant. It awards the placement to the **most relevant ad** and establishes the **cost-per-click** price after considering the bids of the other relevant ads.



The auction winner pays **the amount necessary** to win based on competing bids, which may be less than their maximum bid.

Advanced Second-Price Auction Guide, https://www.walmartconnect.com/content/dam/wmg/documents/insight-articles/2022/2pa-blog-post/Advanced-second-price-auction-guide.pdf.

The following describes a Walmart Connect auction with three bidders:

Here is an example in which there are only three bidders in the auction:

Advertiser A:

- Relevancy Score: 98%
- Bid: $4.50

Advertiser B:

- Relevancy Score 60%
- Bid: $5.00

Advertiser C:

- Relevancy Score: 80%
- Bid: $3.00

Despite having the highest bid, Advertiser B isn't as relevant to the search term as A or C. Given that Advertiser A has the next highest bid and is also the most relevant, Advertiser A is the auction winner. Advertiser A will end up paying somewhere between $3 and $4.50, this amount will be determined by Walmart's algorithms.

Walmart Keyword Bidding, https://perpetua.io/blog-walmart-keyword-bidding-second-price-auction/.

How Do We Use Your Personal Information?

We use your personal information to provide you with products and services and to operate and improve our business. For example, we use it for:

- Performing services, including maintaining or servicing accounts, providing customer service, processing or fulfilling orders and transactions, verifying customer information, processing payments, providing financing, providing analytics services, providing storage, or providing similar services
- Performing and providing advertising and marketing services, including targeted advertising
- To conduct auditing and monitoring of transactions and engagement, including auditing related to counting ad impressions to unique visitors, verifying positioning and quality of ad impressions, and auditing compliance
- Short-term, transient use, such as non-personalized advertising shown as part of your current interaction with us
- Helping to ensure security and integrity and prevent fraud
- Undertaking activities to verify or maintain the quality or safety of our services or devices and to improve, upgrade, or enhance them
- Debugging to identify and repair errors
- Conducting business analysis, such as analytics, projections, identifying areas for operational improvement
- Conducting research and development, including undertaking internal research for technological development and demonstration
- Fulfilling our legal functions or obligations

Walmart Privacy Notice, https://corporate.walmart.com/privacy-security/walmart-privacy-notice.

96. Upon information and belief, Walmart has indirectly infringed and continues to indirectly infringe at least claim 19 of the '402 patent in violation of 35 U.S.C. §271(b). From at least the time Walmart received notice of the '402 patent, Walmart has induced others to infringe at least claim 19 of the '402 patent under 35 U.S.C. §271(b) by, among other things, and with specific intent or willful blindness, actively aiding and abetting others to infringe, including but not limited to Walmart's clients, customers, and end users, whose use of the Accused Products constitute direct infringement of at least one claim of the '402 patent. Walmart's clients, customers, and end users put the Walmart System, including the computer program for implementing Walmart Connect, into service, i.e., control the computer program and obtain benefits from it. These benefits include the targeted search results that the clients, customers, and end users obtain when they control the Walmart System by logging into their accounts and submitting search queries. By causing the Walmart System, including the computer program for implementing Walmart Connect, to process the login and searches and by obtaining the benefits of the results, the clients, customers, and end users use the Walmart System under 35 U.S.C. § 271(a).

97. In particular, Walmart's actions that aided and abetted others such as customers and end users to infringe include providing instruction materials, support training, and services, and actively inducing its customers to sign up for online accounts. *See, e.g.*,

Walmart Departments Services Search everything at Walmart online and in store Reorder My Items Sign In Account $0.00

Help Topics

Your order
Account & payments
Returns & refunds
Walmart services
Walmart+
Shopping with Walmart
Policies and terms of use

Didn't find what you were looking for?

Contact us

Have feedback about a store, product or policy? Let us know

Create or Edit an Account

Use the following information to help create or edit an account on Walmart.com. You can edit your name, phone number, email, and shipping address from your account.

Log in or create account

Follow the steps below to create a Walmart.com account:

1. Select the **Account** button in the upper-right corner of Walmart.com.
2. Click **Create an Account.**
3. Enter your name and email address on the sign-up screen.
   - We may ask you to enter your phone number when creating an account. If we do, we'll send you a text message with a security code to enter on Walmart.com.

Note: You won't be able to create an account if you're prompted to add a phone number and your phone can't receive text messages.

4. Create a password and confirm it.
5. Select **Create Account.**

https://www.walmart.com/help/article/create-or-edit-an-account/147a20c9cada4d75b8e0128b16fb6fda;

See also: https://www.walmart.com/account/login?vid=oaoh&tid=0&returnUrl=%2Fhelp%2Farticle%2Fcreate-or-edit-an-account%2F147a20c9cada4d75b8e0128b16fb6fda%3FchatBot%3Dopen; https://www.walmart.com/help; *see also* https://corporate.walmart.com/askwalmart/what-if-i-have-a-question-about-customer-support; https://one.walmart.com/content/walmartethics/tr_tr/contact-us.html; https://corporate.walmart.com/about/contact; and https://sellerhelp.walmart.com/s/contact?language=en_US.

98. Walmart does so knowing that its customers will commit these infringing acts. Despite its knowledge of the '402 patent, Walmart continues to make, use, sell, and/or offer for sale its infringing products thereby specifically intending for and inducing its customers to infringe the '402 patent.

99. This is supported by Walmart touting all the features customers and end users gain access to by creating an online account.

With an account you can check:

- Order Status
  - We'll send email confirmations when your items have shipped.
  - Email notifications in case our Customer Service needs to contact you about your order.
- Address Book
  - Store unlimited names and addresses and access them for easy checkout.
- Photo Center
  - Upload, store and share your photos online.
- Wish Lists & Registries
  - Keep a running list of your favorite items and planned purchases.

https://www.walmart.com/help/article/create-or-edit-an-account/147a20c9cada4d75b8e0128b16fb6fda.

100. Walmart also gives instruction as to how to maintain the account once created, such as editing personal information or delivery address.

> **Changing or removing delivery addresses**
>
> 1. Select **Account**.
> 2. Select **Delivery addresses**.
> 3. Select **Add new address** next to "Add delivery address" or **Edit** or **Remove** next to the delivery address you wish to change.

https://www.walmart.com/help/article/create-or-edit-an-account/147a20c9cada4d75b8e0128b16fb6fda.

PRAYER FOR RELIEF

WHEREFORE, RavenWhite requests the following relief from this Court:

(A) A judgment that each defendant is liable for infringement of one or more claims of the '823 Patent and the '402 Patent.

(B) Compensatory damages in an amount according to proof, and in any event no less than a reasonable royalty, including all pre-judgment and post-judgment interest at the maximum rate allowed by law;

(C) Pre-judgment interest;

(D) Post-judgment interest; and

(E) A judgment granting RavenWhite such further relief as the Court may deem just and proper.

DEMAND FOR JURY TRIAL

Pursuant to Rule 38(b) of the Federal Rules of Civil Procedure, RavenWhite demands a trial by jury for all issues so triable.

Dated: September 15, 2023

/s/ Deron R. Dacus

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CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing document was filed electronically in compliance with Local Rule CV-5(a). Therefore, this document was served on all counsel who are deemed to have consented to electronic service. Local Rule CV-5(a)(3)(A). Pursuant to Fed. R. Civ. P. 5(d) and Local Rule CV-5(d) and (e), all other counsel of record not deemed to have consented to electronic service were served with a true and correct copy of the foregoing by email on this 15th day of September, 2023.

By: */s/ Deron R. Dacus*
Deron R. Dacus