George Toms, Ph.D.

EXECUTIVE SUMMARY

The storage and processing of big data present well-known challenges, with data typically stored in clouds and processed on supercomputers requiring substantial resources such as RAM memory, storage space, and processing power.

We have invented and fully implemented a new web technology that enables us to harness knowledge from big data using nothing more than a regular laptop, tablet, or phone within a web browser, all tailored to the user's needs rather than the application's limitations. This technology stands without comparison to anything currently available in the world today.

To achieve this level of power in web applications, we have developed a method to process millions of records at an incredibly fast pace and entirely without the need for server support. As a result, our technology accelerates web applications, reduces network bandwidth requirements, and distributes the server load across thousands or even millions of users' client devices.

Our technology is built on current, standard web technologies—JavaScript, HTML, and CSS. No new hardware, programming languages, plugins, or additional resources are required.

CONTENTS

SUMMARY

1. A NEW ERA IN WEB APPLICATIONS

Megadata Web, or "MDW," is a highly disruptive software designed for the web applications environment. With its innovative approach, MDW has the potential to usher in a new era of dramatically more powerful web applications.

2. NEED

MDW addresses the needs for:

- Improved client user decision-making resulting from putting greater power and control into the hands of the user
- Increased speed of Web applications
- The ability to process large volumes of data on the Web client
- Reduced dependency of clients on connectivity with the server / network
- Distributing data processing from servers (where capacity is often threatened) to client-devices (where processing capacity is generally available).

3. SOLUTION

MDW is a comprehensive set of advanced data representation formats, processing routines, and algorithms implemented as a JavaScript library. This technology empowers server-based applications and websites to offload large volumes of data for offline processing at significantly faster speeds directly within a web browser on any client device, with results displayed in a web format.
The library encompasses a wide range of tools, including sorting, filtering, aggregating, storing, representing, displaying, and analyzing data. Additionally, it offers capabilities for rendering screens that present the selected data to users in a user-friendly manner.

4. OPPORTUNITY

Every web application that processes data and meets the following criteria could benefit from the deployment of MDW:

- Requires internet connectivity.
- Faces limitations in browser speed and/or handling large volumes of data.
- Lacks universal browser compatibility.
- Is constrained by server/application processing limitations.
- Is unable to incorporate an effective level of responsive design to fully empower the user.

In the e-commerce sector, for example, MDW has the potential to dramatically enhance the user experience by eliminating pagination and providing mobile devices with significantly greater power to sort, find, filter, and analyze data to support user decision-making.

NEED

1. LIMITATIONS OF WEB APPLICATIONS

1.1 Web Applications are Slow:

- The need to render numerous components can slow down browsers, leading to navigation limitations such as "Infinite Scrolling" and "Pagination." Typically, web applications allow navigation of only 50-100 pages (1,000-2,000 records).
- Web browsers use JavaScript, an interpreted language rather than a compiled language.
- Dependence on constant interaction between client and server increases the bandwidth requirement and slows down the Internet connection speed, crucial for user experience.
- Web applications are hindered by the "thin client" approach, allocating most processing to the server and leaving only UI rendering and user input to the client.

1.2 Web Applications may be limited by the volume of data the client device can hold, based on RAM limitations. Through its advanced data representation formats, MDW can significantly increase the effective volume of data held on the client.

1.3 Web Applications can be limited by browser compatibility issues, where they are not compatible with all browsers. MDW is compatible with all standard browsers, extending the executability of web applications to a broader selection of browsers.

1.4 Web Applications are limited by server and application capabilities. For example, server database platforms often limit indexing to selected fields only, inhibiting users' ability to sort, filter, or aggregate on any parameters.

1.5 Screen rendering techniques do not fully support responsive design objectives. The UI of client devices is constrained by RAM limitations and processing power in rendering the screen to fully satisfy the objectives of responsive design (web application implementation that can be rendered on any size of display).

2. USERS NEED MORE POWER, CHOICE & CONTROL FOR IMPROVED DECISION MAKING

Web-based applications often operate in a "click-wait-refresh" environment, where pagination is a common requirement. However, these applications are limited by the amount of data typically delivered in "chunks" to the client, resulting in an inefficient methodology for selecting, sorting, analyzing, and acting on data.

Users have little control over the scale, selection, and presentation of data necessary for making decisions. Particularly in cases involving big data, limitations on the volume of

data presented to the user and the speed of data processing further restrict the user's access to meaningful information.
Numerous applications are burdened by these limitations, including e-commerce websites, big data analyses such as genome sequencing, web-based email systems like Gmail, banking applications, CRM systems, and many others.

3. DATA PROCESSING NEEDS TO BE DISTRIBUTED AS CLOSE TO THE USER AS POSSIBLE

With the introduction of technologies such as augmented/virtual reality into the human decision-making process, it is increasingly necessary to distribute data processing as close to the decision-maker as possible, utilizing thin-client devices.

4. WEB APP DEVELOPMENT IS LIMITED TO CURRENT BROWSER CAPABILITY

Client device users, especially smartphone users, have increasingly high expectations for mobile and seamless access to people and information. Even when solutions are available via web servers, users demand mobile alternatives.

The availability of significantly enhanced web app browser engine capability will undoubtedly unleash the future development of applications that are not currently imaginable.

5. THE PROCESSING LOAD IS BORNE BY SERVERS, WHILE CLIENTS ARE UNDER-UTILIZED

In the execution of web applications, servers often bear the brunt of the workload, while client devices are underutilized. One limitation of the "click-wait-refresh" methodology is its reliance on servers to provide the necessary scalability. Addressing this scalability challenge typically involves various server-related solutions, such as adding more processors, increasing processing speed, enabling in-memory processing, and expanding storage space.

MDW offers a novel approach by offloading much of the processing task from the server, thereby adding significant scalability on top of existing server-related solutions, rather than replacing them. This approach is a departure from traditional methods and enhances overall scalability without overburdening the server.

6. WEB-APPS ARE DEPENDENT ON UN-INTERRUPTED INTERNET / NETWORK CONNECTIVITY

Web-based apps currently operate under the "click-wait-refresh" paradigm. However, in the event of internet/network connectivity loss, the application becomes non-functional.

SOLUTION

1. THE MDW TECHNOLOGY

MDW is a sophisticated JavaScript library comprising advanced data representation formats, processing routines, and algorithms. This technology empowers server-based applications and websites to offload large volumes of data for processing at significantly faster speeds within the web browser on any client device, with results displayed in a web format.

MDW enhances the browser's capacity to handle, process, and display large data volumes, which can be processed by the client in both offline and online (network-connected) modes. When data is requested from the server, it is delivered raw and unsorted to the client, along with the MDW library (or "toolkit"), and placed in RAM. The toolkit then executes all required data harvesting in-memory.

The MDW library encompasses a comprehensive suite of tools for sorting, filtering, aggregating, storing, representing, displaying, and analyzing data, as well as rendering screens. This allows users to process very large data without requiring support from a server.

2. MDW FEATURES & FUNCTIONS

MDW delivers the following capabilities to the user via a browser-equipped desktop, laptop, tablet, or smartphone:

- Significantly greater processing speed
- Ability to process large volumes of data
- Total portability via cross-browser (any standard browser) and cross-platform compatibility
- Data processing control over searching, sorting, filtering, and aggregating data
- Seamless integration with third-party server databases, middleware platforms, operating systems, and technologies
- Based on current web technologies (JavaScript, HTML, CSS) and requiring no additional hardware, programming languages, plugins, or other resources

3. BENEFITS / ADVANTAGES

3.1 Enhanced Web Applications Environment

- Speed

MDW enables users to scroll through millions of records (objects) in milliseconds. Leveraging advanced algorithms, MDW provides super-fast data processing, overcoming the limitations of the JavaScript interpreted language environment.

Additionally, MDW reduces redundant and unnecessary network traffic, thereby minimizing bandwidth requirements.

In contrast to the "thin-client" approach, MDW adopts a rich (smart)-client approach, efficiently executing server-side SQL tasks such as data searching, sorting, filtering, indexing, formatting, and batch reporting directly on the user's browser-equipped PC, Mac, Unix workstation, tablet, or phone.

- Volume

Employing advanced data representation formats, MDW has the capability to process millions of records on a laptop, tablet, or phone.

- Browsers

MDW ensures complete portability, being compatible across any standard browser platform.

- Users

MDW transcends server/application limitations by granting users access to large volumes of data and empowering them, via laptop, tablet, or smartphone, to search, sort, filter, and aggregate data on any chosen parameters. MDW places powerful information analysis and reporting tools directly into the hands of users, enabling them to solve their own problems effectively.

- Servers

MDW eliminates the need for expensive server hardware expansion and reduces maintenance and upkeep costs associated with web application servers and networks.

- Rendering

The UI of the client device is often hindered by RAM limitations and processing power, limiting its ability to fully meet the objectives of responsive design. However, with its reduced demand for RAM and significantly greater processing speed, MDW can:

- Support the mobile device UI with more visible content, controls, and processing power to match that of the desktop.

- Render the client screen to support responsive design objectives by placing all data and controls "above the fold."

3.2 Power & Control in User's Hands, resulting in better decision-making: With MDW, users wield significantly greater power and control:

- MDW places processing where it's most effective—at the point of use—enhancing users' ability to make informed decisions and take action on provided data.
- MDW eliminates the click-wait-refresh paradigm.
- MDW eliminates scrolling delays and captures a larger amount of data for analysis.
- MDW can access both local and cloud files managed under new JavaScript standards. Users experience an expanded, faster, and more enjoyable browsing experience, leading to improved decision-making. By shifting the data processing burden from the server to the client, MDW significantly enhances users' ability to view and process information, while simultaneously boosting internet access and server throughput.

3.3 Enhanced Web Applications development:

MDW empowers developers to craft portable, single-page business applications with web simplicity, desktop performance, and secure offline data processing, tailored to users' needs rather than application limitations.

3.4 Client can operate independently of Server, without a network connection:

With MDW's enhanced processing capability delivered to the client through the browser, the client can operate independently of the server in offline mode.

MDW tracks the history of offline data editing, replacement, addition, and deletion, managing the process of sending only affected data to the server for batch processing when internet connections become available. Users can view and process their data offline without an internet connection and then sync with the server the next time a connection is available.

MDW enables remote database users (e.g., executives, salespeople, field service technicians, applications engineers, etc.) to perform a "local save," allowing them to disconnect from the internet and continue working on the data offline.

3.5 Processing Load can be re-distributed from Servers to Clients:

By executing processing tasks on client devices, MDW significantly reduces the server processing load. Widespread adoption of MDW in the Web Applications realm could greatly improve system scalability. MDW eliminates the need to pre-process, pre-sort, and

index data on the database server, leading to a substantial reduction in server workload and an increase in server capacity. Millions of user computers can simultaneously streamline and expedite applications, diminishing the need for a large number of server processors to be available to users.

PROOF OF CONCEPT

MDW has been fully implemented and debugged across a range of Internet client/server applications developed by the company. The developer has crafted web systems for visualizing and analyzing data tables containing millions of records.

MDW's features and functionality are detailed and showcased on the company's website at http://www.megadataWeb.com. A summary of the key features is provided below.

1. BROWSER & APPLICATIONS COMPATIBILITY

The technology is compatible and interoperable with all standard browsers, including Chrome, Firefox, Edge, Safari, Opera, Vivaldi, and more. It seamlessly integrates with third-party server databases, middleware platforms, operating systems, and technologies such as .NET, PHP, Java, Node.js, and others. Importantly, it requires no additional client-side software or plug-ins for implementation.

2. ENHANCED SPEED

The superior processing capabilities of MDW, are evident in the following table reflecting MDW benchmarks running on a laptop with 16GB of RAM:

	MDW	MDW	MDW
No. of Rows	1,048,575	8,388,600	16,777,200
File Type	JSON	JSON	JSON
Open File (sec)	1.4	11	20
Sort (sec)	1.5	7	14
Reverse Sort (sec)	0.02	0.05	0.07
Undo (sec)	0.02	0.05	0.07

The MDW library includes a compact data representation algorithm for faster data delivery.

3. REDUCED MEMORY REQUIREMENT

Additionally, the library incorporates an advanced compact data format to address memory restrictions, even on mobile devices.

4. OFFLINE PROCESSING CAPABILITY

MDW can rapidly process millions of records without server support. This accelerates web applications, reduces network bandwidth requirements, and distributes server load to thousands or millions of users' computers.

5. DATA MANAGEMENT TOOLS

MDW's data management features

- Navigation, scrolling
- Sorting, searching, filtering
- Totaling
- Reporting
- Exporting
- Linking, mapping, e-mailing
- Editing, replacing, adding, deleting
- Undo, start over
- Save, save all
- Drag & drop
- Cell & Table customization
- Hierarchical column grouping
- WYSIWYG Editor

6. COPYRIGHTS

Megadata Web has its own technology platform, "George Toms JavaScript (Toms JS)," developed over 17 years and backed by intellectual property copyrights.

- Copyright TXu001015218 / Sep 25, 2001
- Copyright TXu001054453 / Aug 13, 2002
- Copyright TXu001149806 / Nov 03, 2003
- Copyright TXu001603087 / Nov 19, 2007
- Copyright TXu001774539 / Sep 09, 2011
- Copyright TXu002032703 / May 23, 2017

MARKET OPPORTUNITY

1. CURRENT WEB APPLICATIONS ENVIRONMENT

MDW has the potential to revolutionize various sectors of commerce and industry, offering enhanced capabilities and experiences to users across different categories.

Its applications span across e-commerce, investment research, banking, healthcare, education, bioinformatics, CRM and MLS systems, large data file interrogations, customer and employee records, among others. These are just a few examples of the countless possibilities for MDW application.

To illustrate, potential applications could include:

Consumers

- E-Commerce
- Sales Force Automation
- Job Searches
- Investing Research (Stocks & Bonds)
- Class Registrations
- Banking Systems
- Content Management Systems
- Data Warehousing
- Internet Service Providers

Professionals

- Genome Sequencing
- Real Estate Multiple Listing Services
- Commercial Subscription services offering access to large files of target records (such as D&B or Capital IQ)
- Knowledge Management Systems
- Application / Managed Service Providers
- Globalization / Localization

Corporate Employees

- Resource Planning
- Customer Records
- CRM Systems Data
- Employee Records
- Event Registrations
- Processors of Big Data
- Knowledge Workers (analysts, engineers, scientists, researchers, teachers...)

Types of Enterprises

- Internet Search Engines and Web Portals
- Asset Management and Repositories
- Banking & Financial Institutions
- E-Commerce Companies
- Bio-Tech Companies (incl. DNA/RNA processing)
- Scientific Research Companies
- Business Intelligence and Analytics
- Data Storage Systems (Data Lakes)
- Web Acceleration / Caching

Any web-based application that needs to process data has the potential to benefit from integrating MDW, leading to the advantages outlined earlier.

2. MEETING FUTURE NEEDS

Market expectations are soaring, particularly in the realm of empowering mobile devices for seamless interaction with big data and instant processing capabilities. MDW opens the door to this realm.

Dr. Toms firmly believes that distributed offline processing represents the future of the internet. Beyond the substantial benefits it offers to existing web applications, the rise of client devices equipped to rapidly process vast amounts of data is likely to drive increased user demand. This trend is already evident in the smartphone sector, where users are clamoring for expanded applications and greater control.

By significantly boosting the power of web browsers, MDW has the potential to catalyze a "Quantum Leap" in the range of applications suitable for web deployment. Mobile devices are poised to play a central role in facilitating user interaction with data in this evolving landscape.

IP DEVELOPER

Bio of IP Developer

George Toms, Ph.D.
President and CTO

Summary

Dr. Toms is a distinguished expert with advanced mathematical knowledge spanning Algorithm Theory, Artificial Intelligence, Boolean Logic Theory, Discrete Math, Graph Theory, Logic Network Theory, Calculus, Mathematical Logic, and Parallel Data Processing.

His academic background includes a doctorate in mathematical cybernetics and a master's degree in applied mathematics from Tomsk State University in Russia. During his tenure as an Associate Professor at Tomsk State University for over 20 years, he led a laboratory in aerospace technology, focusing on system and software development. Notably, he invented a fast and efficient algorithm for synthesizing easily testable and reliable digital devices.

Since 1996, Dr. Toms has dedicated his efforts to web development, specializing in internet/intranet high-traffic and big data business applications architecture, design, and development. Among his notable achievements are:

- Inventing and fully implementing new web technology enabling users to extract knowledge from big data on standard devices within a web browser, tailored to the user's needs.
- Architecting and developing the Toms JS Scheduler, a single-page business schedule application.
- Significantly accelerating web applications, achieving speeds 5-30 times faster than standard.
- Demonstrating the ability to sort over 1,000,000 records inside a browser (Chrome, Safari, Opera) in just one second.
- Implementing a fast timetable with over 25,000,000 cells for Guardian Analytics, Inc.
- Reducing RAM usage of web applications by a factor of 10.
- Publishing over 20 engineering and research articles.

In his role as President and Chief Technology Officer at Megadata Web LLC since November 2014, Dr. Toms has pioneered groundbreaking web technology to address the challenges posed by big data, enabling users to leverage their devices for data processing without server dependency. This technology, based on standard web technologies like JavaScript, HTML, and CSS, offers unprecedented capabilities without requiring additional resources.

Previously, as a Senior Software Engineer and Architect at Guardian Analytics LLC from July 2008 to October 2014, Dr. Toms played a key role in developing cross-browser user interfaces and advanced AJAX client-side JavaScript engines for RIA FraudMap™, a fraud detection solution.

Dr. Toms' contributions have not only advanced the field of web development but also revolutionized the way users interact with and process data, paving the way for a new era of web-based applications.

Education

Tomsk State University
Doctor of Philosophy, Mathematical Cybernetics, 1975 - 1977

Tomsk State University
Master's degree, Applied Mathematics, 1967 - 1972

"The goal is to turn data into information, and information into insight."

- ***Carly Fiorina (Chief Executive Officer of Hewlett-Packard)***