George Toms, Ph.D.

EXECUTIVE SUMMARY

The storage and Processing of Big data is a well-known problem with the data currently being stored on clouds and processed on super computers with burdensome resources (RAM memory, storage space, and processing power).

We invented and fully implemented new Web technology that allows us to harvest knowledge from big data on a regular laptop, tablet, or phone inside a Browser based on the user's needs – not the application's limitations. This technology has no comparatives which currently exist in the world today.

To achieve this power of web applications, we found a way to process millions of records extremely fast and without any server support. As a result, our technology accelerates the Web application, reduces network bandwidth requirements, and distributes the server load to thousands or millions of users' client devices.

Our technology is based on current, standard web technologies: JavaScript, HTML, and CSS. No new hardware, programming languages, plugins, nor are any other resources required.

CONTENTS

SUMMARY

1. A NEW ERA IN WEB APPLICATIONS

Megadata Web or “MDW” is highly disruptive software targeting the Web Applications environment. 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 set of advanced data representation formats and data processing routines and algorithms implemented as a JavaScript library. The technology enables server-based apps and websites to **offload volumes of data to be processed offline, at dramatically greater speed**, inside a Web browser on any client device, displaying the results in a Web format.
The library includes a full array of tools for sorting, filtering, aggregating, storing, representing, displaying and analyzing data, and for rendering screens displaying the selected data to the user.

4. OPPORTUNITY

Every Web application, which processes data and which:

- Requires Internet connectivity,
- Is constrained by browser speed and/or the ability to engage large volumes of data,
- Lacks universal browser compatibility,
- Is dependent on server/application processing limitations, or
- Is not able to incorporate an effective level of responsive design to fully empower the user,

could benefit from the deployment of MDW.

In the e-commerce sector, alone, MDW could dramatically change the user experience, by eliminating pagination and equipping mobile devices with far greater power to sort, find, filter and analyze data in support of user decision making.

NEED

1. LIMITATIONS OF WEB APPLICATIONS

1.1 Web Applications are Slow:

- The need to render too many components makes browsers slow, resulting in navigation limitations such as “Infinite Scrolling” and “Pagination”. Web applications typically 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 a constant back-and-forth interaction between client and server, which increases the bandwidth requirement and slows down the resultant Internet connection speed, a critical component of the user experience.
- Web applications are hampered by the “thin-client” approach, which allocates all of the processing to the server, leaving only UI rendering and user input to the client.

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

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

1.4 Web Applications are limited by server and application capabilities. For instance, server database platforms typically limit indexing to selected fields only, inhibiting the user’s ability to sort, filter or aggregate on any parameters.

1.5 Screen rendering techniques do not support responsive design objectives. The UI of the client device is hampered by RAM limitations and processing power in its ability to render 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 operate in a “click-wait-refresh” environment, often dominated by the requirement for pagination by the user. Web Applications are limited by the amount of data, typically delivered in “chunks”, that is available to the client. These

limitations result in an inefficient methodology for selecting, sorting, analyzing and acting on that data.

The user has very little control over the scale, selection and presentation of data needed to make decisions. In addition, particularly in cases where big data is involved, limitations on the volume of data presented to the user, as well as the speed with which that data is processed, further limit the user's ability to access information, which would be truly meaningful.

There are numerous examples of applications which are burdened by these limitations. A selection might include e-commerce websites, Big Data analyses like genome sequencing, Web-based e-mail systems like Gmail, banking applications, CRM systems, and many more.

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 the processing of data as close to the decision-maker as possible, via a thin-client device.

4. WEB APP DEVELOPMENT IS LIMITED TO CURRENT BROWSER CAPABILITY

Client device users, particularly smart phone users, have increasingly high expectations of mobile and seamless access to people and information. Even when solutions can be delivered by Web servers, users demand mobile alternatives.

The availability of a significantly enhanced Web App browser engine capability, will undoubtedly unleash future development of applications not currently imaginable.

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

In the execution of Web Applications, it is the servers, which are doing most of the work while the client devices are under-utilized.

One of the limitations of the "click-wait-refresh" methodology is the dependency on the server(s) to provide the scale needed to expand. The "click-wait-refresh" approach to solving the scale problem can include: adding more processors, increasing the processing speed of the server, enabling in-memory processing within the server system, adding storage space, plus...many more. MDW, by removing (off-loading) much of the processing task from the server, is a truly novel approach that adds substantial scale on top of (not in lieu of) the server- related solutions.

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

Web-based apps currently operate under the “click-wait-refresh” paradigm. In the event that Internet / network connectivity is lost, for any reason, the application can no longer function.

SOLUTION

1. THE MDW TECHNOLOGY

MDW is a set of advanced data representation formats and data processing routines and algorithms implemented as a JavaScript library. The technology enables server-based apps & websites to offload volumes of data to be processed, at dramatically greater speed, inside the Web browser on any client device, displaying the results in a Web format.

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

The library includes a full array of tools for sorting, filtering, aggregating, storing, representing, displaying and analyzing data and for rendering screens, allowing the user to process very large files without support from a server.

2. MDW FEATURES & FUNCTIONS

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

- 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 3rd party server databases, middleware platforms, operating systems and technologies
- Based on current Web technologies (JavaScript, HTML, CSS) and requiring no additional hardware, programming languages, plug-ins or other resources

3. BENEFITS / ADVANTAGES

3.1 Enhanced Web Applications Environment

- Speed

MDW allows users to scroll millions of records (objects) in milliseconds. Using advanced algorithms, MDW delivers super- fast data processing, mitigating the impact of the JavaScript interpreted language environment. MDW reduces the redundant and unnecessary network traffic, minimizing bandwidth requirements.

As opposed to the “thin-client” approach, MDW facilitates a rich (smart)-client approach, more efficiently accomplishing server- side SQL tasks like data searching, sorting, filtering, indexing, formatting and batch reporting on the user’s browser-equipped PC, Mac, Unix workstation, tablet or phone.

- Volume

Using advanced data representation formats, MDW can process millions of records on a laptop, tablet or phone.

- Browsers

MDW delivers total portability, with compatibility across any standard browser platform.

- Users

MDW overcomes server / application limitations by providing the user access, via laptop, tablet or smart phone, to large volumes of data and the ability to search, sort, filter and aggregate on any chosen parameters. MDW puts powerful information analysis and reporting tools directly into the hands of the people who know best how to solve their own problems.

- Servers

MDW eliminates the need for expensive server hardware expansion, and decreases the maintenance and upkeep of Web application costs related to the server and network.

- Rendering

The UI of the client device is hampered by RAM limitations and processing power in its ability to render the screen to fully satisfy the objectives of responsive design. 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 in support of 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, the user has much greater power and control:

- MDW puts the processing where it belongs ... at the point of use, enhancing the user’s ability to make decisions and act on the data provided

- MDW eliminates the click-wait-refresh paradigm

- MDW eliminates scrolling delays and captures a much larger amount of data for analysis

- MDW can access local and cloud files created and managed under the new JavaScript standards.

The user has an expanded, faster and more enjoyable browsing experience, all of which will translate into better user decision-making. By transferring the data processing overhead from the server to the client, the user’s ability to view and freely process information is significantly enhanced, while simultaneously increasing Internet access and server throughput.

3.3 Enhanced Web Applications development

MDW enables developers to create portable, single-page business applications with Web simplicity, desktop performance, and secure offline data processing, based on the user’s needs, not the application’s limitations.

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

With the significantly enhanced processing capability, which MDW gives to the client through the browser, the client can operate independently of the server in off-line mode.

MDW tracks the history of off-line data editing, replacement, adding and deleting, and manages 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 next time a connection is available.

With MDW, remote database users (i.e. executives, salespeople, field service technicians, applications engineers, etc.) can perform a “local save”, allowing them to disconnect from the Internet and continue working on the data off-line.

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

Processing now executed on client devices can dramatically reduce the server-processing load. Broad adoption of MDW in the Web Applications world could significantly enhance system scalability.

MDW eliminates the requirement to pre-process, pre-sort and index data on the database server – a significant reduction in server workload, and increase in server capacity.

Millions of user computers can simultaneously simplify and accelerate applications, reducing reliance on the number of server processors, which would otherwise need to be available to users.

PROOF OF CONCEPT

MDW is fully implemented and debugged on a variety of Internet client/server applications owned by the company. The developer has created Web systems for visualization and analysis of data tables with millions of records.

MDW's features and functionality are described and demonstrated on the company's Website at http://www.megadataWeb.com. A summary of the key features is included below.

1. BROWSER & APPLICATIONS COMPATIBILITY

The technology is compatible and interoperable with all standard browsers (Chrome, Firefox, Edge, Safari, Opera and Vivaldi) and can be integrated easily and seamlessly into any existing Web application. It Integrates seamlessly with 3rd party server databases, middleware platforms, operating systems and technologies (e.g., .NET, PHP, Java, Node, JS...), and requires no additional client-side software or plug-ins.

2. ENHANCED SPEED

The superior processing capabilities of MDW, are evident in the following table reflecting MDW benchmarks compared, purely for context, to those same specific features in Microsoft's Excel, running on a laptop with 16GB of RAM:

(Last 4 rows in seconds)	Excel	MDW	MDW	MDW
No. of Rows	1,048,575	1,048,575	8,388,600	16,777,200
File Type	CSV	JSON	JSON	JSON
Open File	13	1.4	11	20
Sort	5	1.5	7	14
Reverse Sort	3	0.02	0.05	0.07
Undo	2.5	0.02	0.05	0.07

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

3. REDUCED MEMORY REQUIREMENT

In addition, the library includes an advanced compact data format to mitigate the challenge of memory restrictions, even for mobile devices.

4. OFFLINE PROCESSING CAPABILITY

MDW can process millions of records extremely quickly and without any server support. As a result, the technology accelerates Web applications, reduces network bandwidth requirements, and distributes the server load to thousands or even millions of users' computers.

5. DATA MANAGEMENT TOOLS

MDW data management features are described on the Website and can be reached via the link: http://www.megadataWeb.com/features/index.html. This “toolkit” of features includes:

- 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)” which has been developed over 17 years and which is backed by the following 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 potentially has application across a broad swathe of commerce and industry, with an almost limitless potential for delivering an enhanced capability and experience to users in different categories.

Applications such as e-Commerce, Investment Research, Banking, Healthcare, Education, Bioinformatics, CRM and MLS Systems, Large Data File Interrogations of all sorts, Customer and Employee Records, are but a small sample of the endless possibilities for application of MDW.

Purely as an illustration, a small selection of potential applications might 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 required to process data, can potentially benefit from the incorporation of MDW, yielding the benefits described above.

2. COMPETITIVE ADVANTAGES OF MDW

No direct competitor to the MDW technology is known to operate in the browser environment. MDW claims the following competitive advantages:

- 1st to market
- Simplicity, usability, functionality and flexibility
- Greater Performance: increase in processing speeds and data volumes
- Scalability with significant distributed processing impact
- Bandwidth impact through reduced connectivity requirement

Megadata Web delivers the following:

- Off-line data processing capabilities
- Desktop performance
- Cross-browser and cross-platform compatibility: reliability, availability, scalability and security are given on a widest array of platforms and browsers.
- Does not require any form of formal installation to be carried out on any client computer before it can be used: code written purely in standard JavaScript, HTML (DHTML) and CSS.
- Leaves a zero "footprint" on any computer it runs on after being used
- The distributed programming model
- Low bandwidth requirements
- Thin Web client simplicity
- Fat architecture is supported
- Fast, simplified and more efficient Website maintenance
- No additional security holes
- Flexible and adaptable look and feel
- Ubiquitous end user access via browser

3. MEETING FUTURE NEEDS

Market expectations are high, for further empowering mobile devices for future interaction with big data and the ability to process it instantly. MDW opens the window on this world.

Dr. Toms believes that distributed offline processing is the future of the Internet. In addition to the significant benefit to existing Web applications, the advent of client devices empowered to process large amounts of data very rapidly, will undoubtedly result in the growth of user demand, already evident in the smart phone sector, for more and expanded applications and for increased user control.

By bringing a significant increase in power to the Web browser, MDW has the potential to support a “Quantum Leap” in the applications for which a Web App is the right solution. Mobile devices are likely a key point of access for that user interaction with data.

IP DEVELOPER

Bio of IP Developer

George Toms, Ph.D.
President and CTO

Summary

Dr. Toms holds advanced mathematical knowledge in Algorithm Theory, Artificial Intelligence, Boolean Logic Theory, Discrete Math, Graph Theory, Logic Network Theory, Calculus, Mathematical Logic, and Parallel Data Processing.

He is an expert in distributed Web client (browser) off-line data processing, Rich Internet applications, software integration and internationalization, algorithm optimization, mathematical logic, parallel Boolean data (vectors and matrices) computing, data sorting and searching, text parsing and processing, custom database optimization, and application acceleration.

Dr. Toms earned his doctorate in mathematical cybernetics and his master's degree in applied mathematics from Tomsk State University in Russia.

During the 20+ years he was an Associate Professor at Tomsk State University, he also worked as the lead of the laboratory in aerospace technology developing systems and software. He invented the fast and efficient algorithm for synthesis of easily testable and reliable digital devices.

Since 1996, Dr. Toms has concentrated his efforts in Web development. He has extensive experience in internet/intranet high-traffic and big data business applications architecture, design, and development.

Some of his accomplishments include the following:

- Invented and fully implemented new Web technology that allows Web users to harvest knowledge from big data on a regular laptop, tablet, or phone inside a browser based on the user's needs – not the application's limitations.
- Architected and developed the Toms JS Scheduler – single-page business schedule application
- Increased the speed of Web applications by 5-30X the standard speed
- Can sort 1,000,000+ records inside a browser (Chrome, Safari, Opera) in one second
- Implemented the fast timetable with 25,000,000+ cells for Guardian Analytics, Inc.
- Reduced RAM usage of Web applications by a factor of 10
- Published 20+ engineering and research articles

Experience

President and Chief Technology Officer at Megadata Web LLC
November 2014 - Present

Big data is a well-known problem, which is currently being stored in the cloud and processed on super computers with burdensome resources (RAM memory, storage space, and processing power).

Dr. Toms invented and fully implemented new Web technology that allows Web Users to harvest knowledge from big data on a regular laptop, tablet, or phone inside a browser based on the user's needs – not the application's limitations. This technology currently has no known competitive IP products.

To achieve this power of web applications, Dr. Toms found a way to process millions of records extremely fast and without any server support. As a result, his technology accelerates Web applications, reduces network bandwidth requirements, and distributes the server load to millions of users' computers.

The technology is based on current, standard web technologies: JavaScript, HTML, and CSS. No new hardware, programming languages, plugins, or any other resources are required.

Senior Software Engineer and Architect at Guardian Analytics LLC
July 2008 - October 2014 (6 years 4 months)

Architected and developed cross-browser user interface with advanced AJAX client-side JavaScript engine for RIA FraudMap™, which delivers actionable and accurate fraud detection by identifying behavior inconsistent with the individual online account holder.

FraudMap™ UI based on Ardent JavaScript™ - Dr. Toms' cross-browser technology, which allows the creation of a desktop application inside a Web page

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)***