mediarich®
SERVER

White Paper

eQ equilibrium®

Contents

Executive Summary

This white paper is intended for anyone involved in creating, maintaining, and distributing content for websites, mobile devices and cloud configurations – site owners, designers, producers, developers, and IT professionals. It describes the MediaRich® Server, Equilibrium's breakthrough patented infrastructure solution for publishing any visual assets to the web, mobile devices, and anywhere else digital content is viewed or used.

MediaRich currently powers some of the largest B2B portals, web 2.0 infrastructures and SharePoint sites in the world. MediaRich customers include Cisco, Disney, Omnicom TMV, Sony Pictures, and Warner Bros.

Media Production Challenges

The current process of developing and deploying compelling visual content to the Web is tedious, time-consuming, and expensive, requiring a small army of graphic designers, video creators and Web developers to painstakingly manipulate and produce every image and video required. Businesses are currently spending thousands to millions of dollars annually in an effort to deliver more dynamic, visual content on their websites. Using traditional methods of media production, it is virtually impossible for businesses with thousands of existing and new products to deploy quality images and videos of every product or service. Even updating an existing inventory of images or videos on a regular basis is a difficult and expensive task. In addition, besides deploying to web, there is the need to deploy to a variety of mobile devices.

Equilibrium's MediaRich Solution

MediaRich helps companies overcome these challenges. MediaRich incorporates a powerful rules-based system for processing all media assets that enables unlimited variations of a single source image or video to be published anywhere, including to the Web, mobile devices, appliances, and more.

As an integral part of a website's infrastructure, MediaRich dynamically generates and instantly deploys large numbers of media assets to create a more visually compelling online experience, enabling businesses to maximize revenue, control production costs, and create new ways to market and sell online. MediaRich is:

- Driven by a powerful scripting language that provides superior image and video processing control

- Built on proven server technology that integrates seamlessly with existing architecture and infrastructure

- Optimized to serve images and videos quickly and efficiently

- Managed through web-based administration tools

- Designed for reliability, scalability, extensibility, compatibility, and security

With MediaRich, e-commerce and content sites will see an immediate return on investment with minimum disruption to their current workflow.

The Need for a New Media Publishing Technology

The Internet has matured into a mass medium for e-commerce and content delivery, with experts in agreement that the surface of the Internet's full potential has been barely scratched.

Despite the exponential growth of the Internet, most websites continue to provide only limited text-based experiences sprinkled with static graphics, images and some videos. One recent survey indicated that 56 percent of Internet users who are online at least two hours a day report that website content is boring and lacks interactivity. As a result, much of the promise of the Internet as a powerful e-commerce and content delivery medium is being held back due to the challenges associated with developing and preparing compelling visual content. In order for businesses to harness the full revenue potential of the Internet, a new, powerful publishing technology is required to improve the production process for deploying all types of media assets.

This new media publishing technology should:

- Generate images and videos on demand to display fresher, more original content

- Eliminate the need to create multiple versions of the same image or video

- Reduce media production costs

- Have the ability to create new marketing opportunities such as personalized and hyper-targeted advertising, sales, and marketing campaigns

- Enable quick and easy website redesigns and updates that take advantage of changing market conditions

- Allow content to be created once and delivered anywhere, for any bandwidth or mobile device

- Offer ample opportunities to extend to meet current and future website needs

- Provide rich, customer-satisfying experiences to future generations of wireless devices and Internet appliances

- Enable the fastest possible loading of content

MediaRich provides all these features, and more.

MediaRich Overview

MediaRich is a server-based platform that automates the entire media publishing process. As a breakthrough technology, MediaRich overcomes the last remaining barrier for database-driven websites - the ability to template media. Rather than process each image or video individually, MediaRich uses a powerful scripting language to modify the original assets at the server level so that thousands of images and videos can be generated and delivered dynamically, on-the-fly.

MediaRich lets companies deploy a new generation of fresh, compelling, graphically rich websites that are scalable and easily implemented. MediaRich's advanced image and video processing radically reduces the costs, in terms of time, expenses, and human resources, associated with the traditional Websites development process.

MediaRich's Key Strengths

- Extensive Capability Set

- Expressive Power

- Ease of Integration

How MediaRich Works

MediaRich uses a unique scripting language approach that provides unlimited media manipulation and unprecedented levels of control over website graphics and videos. Its open architecture and Software Development Kit (SDK) allows websites to scale with ease and to extend MediaRich to manage most media types. MediaRich incorporates a caching technology that identifies frequently requested objects, then caches them locally, thus speeding up the delivery of rich media. Through Web based administration tools, system administrators have several levels of control over the media cache and are able to access external hardware caches.
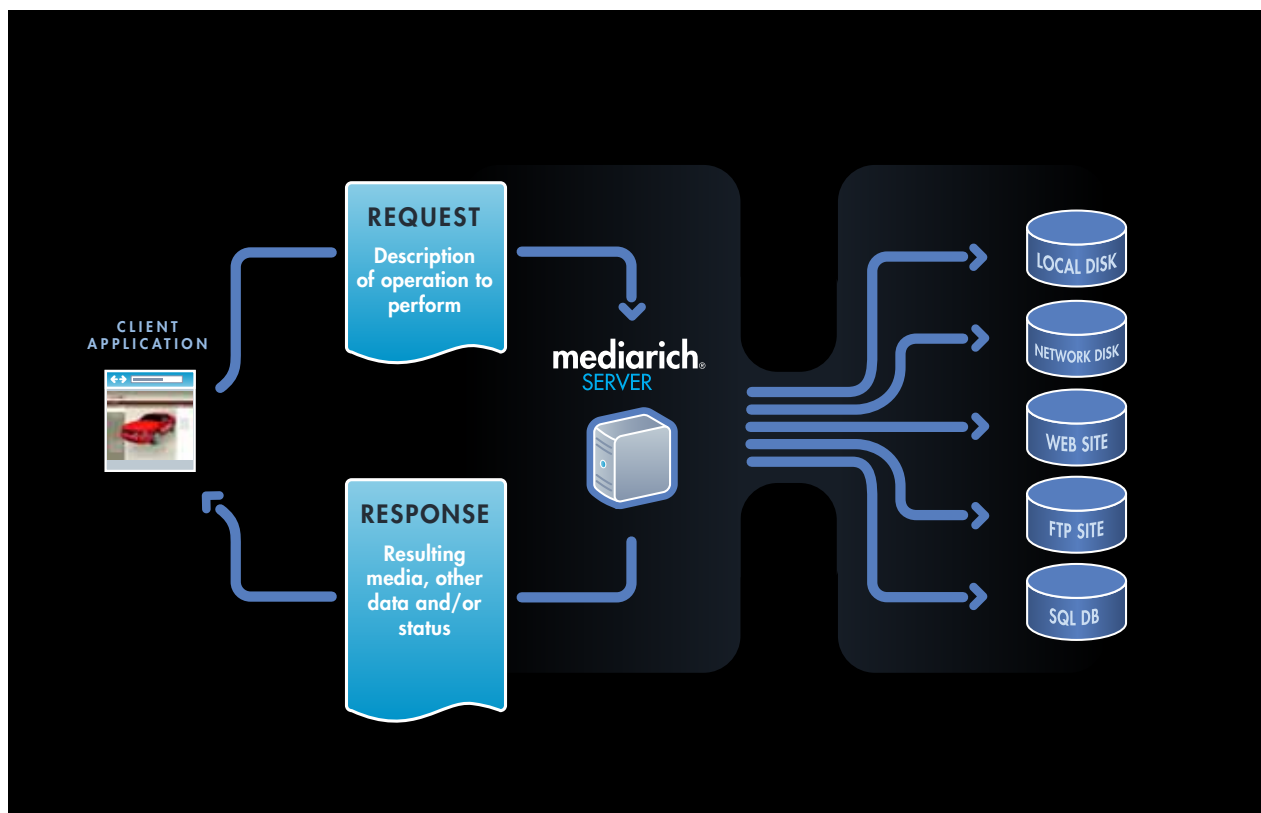
MediaRich Capabilities
Image and Document Processing

- Extensive suite of 2D imaging operations, including powerful compositing and text rendering

- Support for over 300 file formats, including Raw Camera File support (DNG, etc.) and JPEG 2000

- Extensive color management via ICC color profiles

- Forensic watermarking via Digimarc Image Bridge technology

- Reading and writing of embedded Exif, IPTC and XMP metadata

- Rendering of Microsoft Office and PDF/EPS documents

Video and Audio Processing

- Repurposes high-definition originals for device and user specific delivery

- Formats include Windows Media, QuickTime, MPEG 2 & 4, Flash, 3G, Real Networks, AVI, DV and others

- Any number of source segments may be combined to produce the final output

- Dynamically add transitions and other effects

- Arbitrary graphics operations can be applied frame-by-frame during input mixing and transcoding

- Intelligent frame selector for creating thumbnail, preview and proof sheet representations

- Metadata extraction and embedding

- SMPTE Timecode support

Expressive Power
Programmability

- All operations are defined in MediaScript, a ECMAScript (JavaScript) compliant, object oriented programming language

- No restrictions on what can be passed in with the request or returned with the response

- All language features are fully double-byte (Unicode) character capable

- Object libraries are included for:

    Direct access to any local or remote filesystem, including access via HTTP, FTP and ODBC XML and DOM manipulation

    Full access to HTTP request and response headers

    Direct control over local and external caching

Extensibility

- MediaRich is third party extensible in native C code as well as via MediaScript libraries

- Drop-in extensions can be created to add:

    Language objects

    Graphics operations

    File formats

    File systems

    Cache Control

Connectivity

- Most operations can be accessed via a standard HTTP request or a Web Services transaction

- MediaRich naturally integrates with and extends Web 2.0 development technologies (Ajax, DHTML, etc.)

- Object-oriented programming APIs are available for Java, .NET (C#, Visual Basic, etc.), COM and C++

- Back-end support provided for reading from and writing to network attached storage, content management systems, databases, web servers and FTP servers

- MediaRich can cooperate with external caches both inside the firewall and on the edge

MediaScript

MediaRich employs a rules-based publishing engine that allows media assets to be combined and repurposed without restriction. Nearly any transformation that a developer can conceive of can be performed by MediaRich. The expressive power of MediaRich is obtained through MediaScript™, a powerful scripting language. MediaScript is based on the same ECMA Script standard as JavaScript, with unique extensions added for media processing. If a Web producer or developer is familiar with JavaScript, they will be able to learn MediaScript in a matter of hours.

MediaScript supports many of the basic ECMA Script objects and programming constructs, but its strength lies in its unique media processing functions. These functions allow users to create image and video manipulation templates that provide precise control of a website's look and feel, even as the images and videos that comprise the site are changed and updated. The product comes complete with sample code and examples for easy implementation of zoom & pan, image and video repurposing, mobile delivery, metadata manipulation, and other functionality.

The following simple MediaScript loads an original TIFF image named car.jpg, rotates the image 33 degrees clockwise, then saves the resulting generated asset as a JPEG file:

```
var image = new Media();
image.load(name @ "car.tif");
image.rotate(angle @ 33);
image.save(type @ "jpeg");
```

MediaRich APIs

MediaRich provides a number of APIs (Application Programming Interfaces) that allow client and middleware applications to communicate with MediaRich to make use of its functionality. Those APIs are HTTP, Java, .NET and Web Services.

HTTP API and MediaRich Locators (MRLs)

The most popular API used to communicate with MediaRich is its HTTP API. Any client or middleware application that can act as a HTTP client can make requests to MediaRich and receive back results.
In this case, MediaRich uses MediaRich Locators (MRLs) to locate all of the media elements required to create and serve the final assets to a user's browser. MRLs extend the functionality of fully qualified URLs by appending additional information unique to MediaRich .

The most basic MRL looks like this:

```
http://www.eq1.com/mgen/scripts/ptag.ms
```

   `www.eq1.com` - URL of the MediaRich server that contains the MediaScript and the media

   `mgen` - Identifies this as a MediaRich MRL

   `scripts` - location of the MediaScript to execute

   `ptag.ms` - name of the MediaScript to execute

MRL encoded arguments can be appended to the MRL in the form of a query string.

An MRL with a query string looks like this:

```
http://www.eq1.com/mgen/scripts/ptag.ms?f=ChooseLogo&args="tomato.jpg",128
```

f=ChooseLogo - function that will be executed within the MediaScript

args="tomato.jpg",128 – the parameters required by the specific function (any number of parameters can be used within a single MRL)

A MediaScript can also access arbitrary query parameters on the MRL. For example, the following MRL might be equivalent to the one just above:

```
http://www.eq1.com/mgen/scripts/ptag.ms?f=ChooseLogo&source=tomato.
jpg&width=128
```

This form is more readable, as each parameter is supplied with a name that serves to indicate the purpose of the parameter.

Parameters can be hard coded into an MRL or passed as variables from an external source.

Using JSP (for example), parameters can be passed in the MRL that pull information from an external database.

An MRL that uses JSP looks like this:

```
http://www.eq1.com/mgen/scripts/uber.ms?f=spotBlade&args=
%22<%=sitename%>%22,%22<%= bandName %>%22&p=<%= bw %>
```

When a user opens a page containing this MRL in their browser, the MRL calls the uber.ms MediaScript. That MediaScript contains the function spotBlade, which dynamically generates a derivative using an original asset (or assets), as well as the sitename and bandName variables. The variables sitename and bandName are pulled from a database, and the generated image changes dynamically based on the information in that database. The p argument is an example of a user profile that uses the bw variable to optimize the generated image based on a bandwidth specified by the user.

With MRLs and MediaScripts, updating a website is as easy as modifying information in the database, or editing the MediaScript.

.NET and Java APIs
The .NET and Java APIs can be used to access MediaRich's functionality from these programming languages. Utilizing these APIs provide nearly identical capabilities to that of using the HTTP API. The primary difference is that the .NET and Java APIs can be used to pass binary data, such as source images to be used in an operation, as part of a MediaRich request. In the case of HTTP, the source images or other necessary binary data must already be available to the MediaRich Server.

The .NET and Java APIs are nearly identical in function and form. For brevity, only C# example will be presented here. Understand that this example can easily be translated to either another .NET language (VBScript primarily) or to Java.

Here is an example of C# code that performs the same request as the last MRL example given above:

```
1  MGConnection connection = new MGConnection("www.eq1.com");
2  MGRequest request = connection.CreateRequest();
3  request.SetScript("ptag.ms");
4  request.SetFunction("ChooseLogo");
5  request.SetParam("source", "tomato.jpg");
6  request.SetParam("width", "128");
7  MGResponse response = request.Commit();
```

Line 1 establishes a connection with the MediaRich server. Line 2 creates a new request to be sent to the server. Lines 3-6 configure the request with all the necessary information to fully define it. Note that the same information is being supplied as in the MRL example given previously.   Finally, line 7 submits the request and receives back an object representing MediaRich's response.

Upon successful execution of this code, the "response" object contains all of the information necessary for the calling application to know if the requested operation completed, and if so, to obtain whatever results were returned by MediaRich.

MediaRich Servers

MediaRich servers are Web servers optimized for generating and serving images, video, and other media assets. IT staff can easily scale websites to handle increased traffic simply by adding additional MediaRich servers.

Equilibrium® MediaRich Servers support Microsoft® Windows Server, Apple® Mac OS, Linux, and Sun® Solaris operating systems, and integrate with Microsoft's IIS and Apache® Web server

Architecture

MediaRich's architecture is modular, maximizing its flexibility and extensibility. Robust Client API Libraries allow MediaRich to be tightly integrated with existing infrastructure

MediaRich is designed to preserve a customer's infrastructure investments, integrating easily and seamlessly with existing infrastructure systems and technology such as asset management solutions, HTML authoring tools, content management systems, and Content Distribution Networks (CDNs).
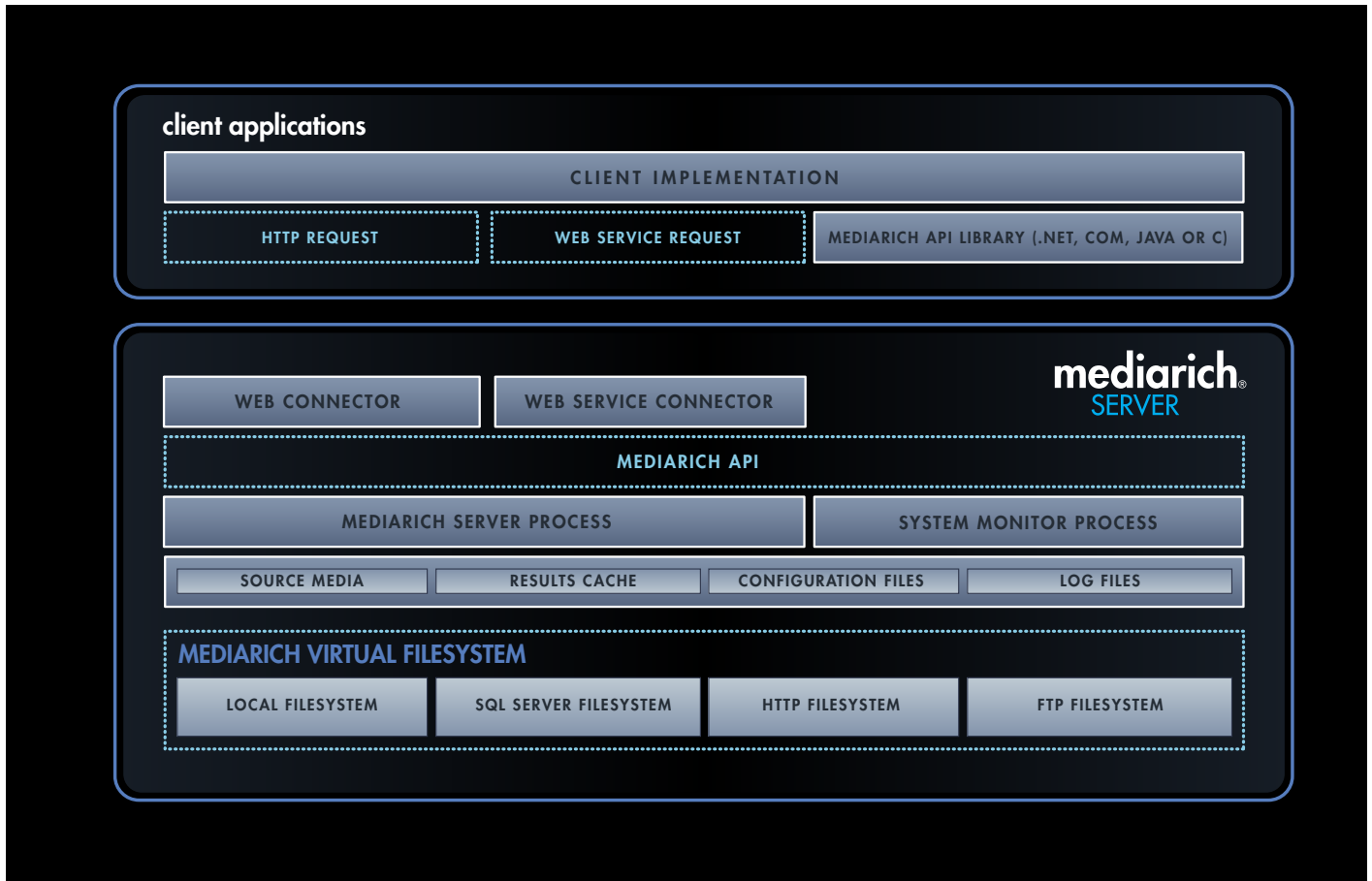
Three of MediaRich's key differentiating features are:

- Derivative Cache

- MediaScript Language

- Input from practically any source
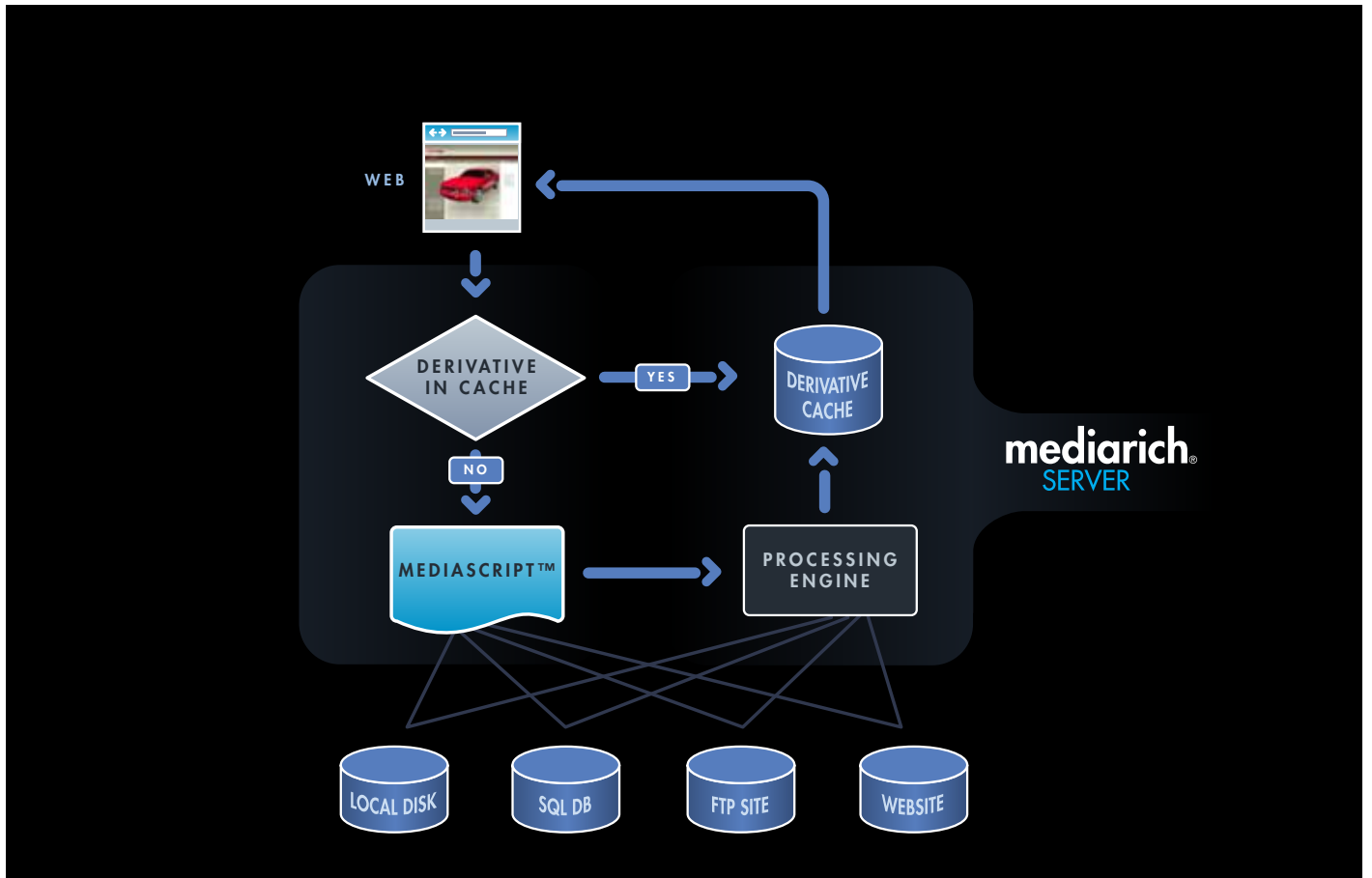
Operation

When a user's browser requests media from the MediaRich system, two basic scenarios can unfold depending on whether the requested media has already been generated or not:

- Pre-cached media delivery scenario

- Dynamic media creation scenario

In the pre-cached media delivery scenario, the requested media has been generated previously and stored in the hardware cache. When the load balancer receives the new request, it retrieves the media directly from the hardware cache.

In the dynamic media creation scenario, a media request moves from the browser to the load balancer. Since the request has not been made before, the load balancer forwards the request to the media server. The media server requests the appropriate source media and MediaScript from a common filer to generate the media. The generated media is saved to the common filer and sent to the hardware cache. The hardware cache stores the media and returns it to the load balancer, which passes the dynamically generated media to the requesting browser.

Caching

MediaRich uses the full power of caching to increase the delivery speed of visually rich media to websites. The first time an image or video is requested, MediaRich saves the newly generated asset in its media cache. If the same asset is requested again, it is immediately delivered from cache to user without having to be reprocessed, therefore reducing the load on the media servers and providing a faster response time. The media cache is built into every media server and can be replaced with an optional hardware cache on the same network, or a CDN cache. Administrators have complete control over the cache and can specify:

- How long an asset is stored in the cache based on its creation date or the amount of time since the asset was last accessed

- When to clear the cache completely

- Whether or not an asset can be cached in a user's browser

Administration

MediaRich provides a central administration application that allows any number of MediaRich servers to be administered from a central location. The administration application can be run on workstation class machines as well as on servers, allowing an IT administrator to easily manage the MediaRich server farm from his own desktop.

Performance

Leveraging almost 20 years of image and video processing experience, Equilibrium has optimized MediaRich for the highest levels of performance. Platform and Web server configurations have been optimized to provide the fastest delivery of media.

Scalability and Reliability
MediaRich offers the scalability and reliability necessary to allow IT managers and staff to quickly and easily support site expansion and aggressive new advertising, sales, and marketing campaigns.

MediaRich scales both horizontally and vertically. Additional hardware caches can be added as site traffic increases, and additional media generators can be added as image processing requirements increase. Existing media generators and filers can be replaced with more powerful systems if additional machines are not necessary. MediaRich is infinitely scalable and additional servers can be added with no downtime for existing servers.

- Enterprise proven 24/7 reliability

- MediaRich was designed from the ground up for multitasking and scalability

- A single MediaRich installation will utilize any number of available processor cores

- Any number of MediaRich servers may be clustered to maintain responsiveness as demand loads grow

- Shared caching insures that results produced by one server can be later delivered by any server in a cluster

Future Extensions
MediaRich is designed to support future generations of Internet appliances and mobile devices.

Its open architecture and Software Development Kit (SDK) allow companies to easily add functionality such as additional file type support, additional media operations, and controllable external caches.

Almost any feature that can be conceived of that is not included in MediaRich today can be added by a systems integrator or customer with a basic knowledge of C++.
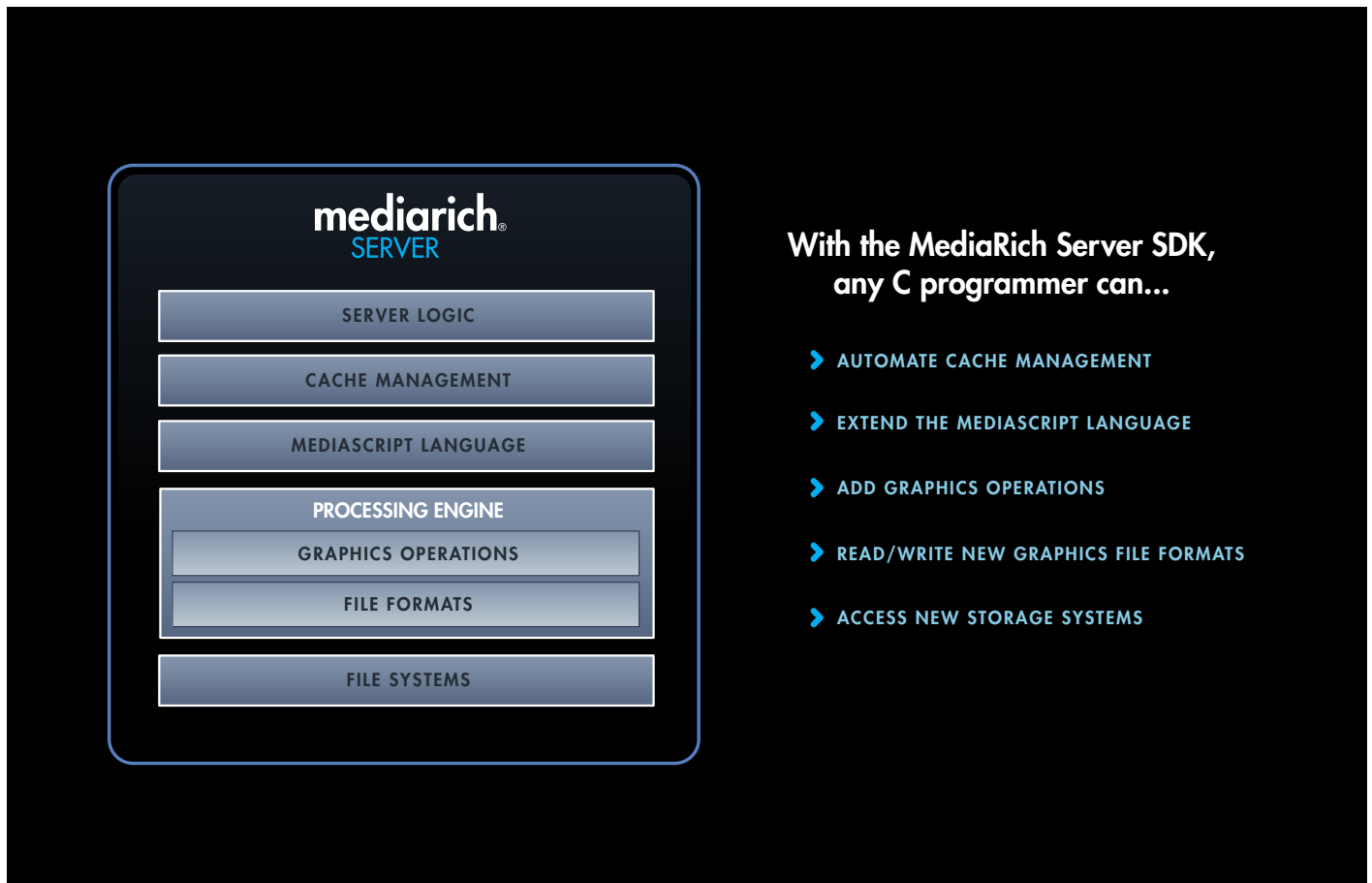
Compatibility
MediaRich preserves a company's previous infrastructure investments by easily integrating with existing content creation solutions, authoring tools, asset management solutions, and Content Delivery Networks (CDNs). MediaRich supports over 300 graphics and video file formats. MediaRich also supports Photoshop plug-ins and filters, and other third-party plug-ins such as Digimarc watermarking.

Conclusion

Equilibrium's MediaRich can improve website performance, help control production costs, and increase revenues. MediaRich dynamically generates images and videos to display fresher, more original content and support dynamically deployed advertising, sales, and marketing campaigns, while reducing media production costs associated with frequent site redesign. MediaRich lets sites create content once and deliver it anywhere, for any mobile device, without costly regeneration of assets. MediaRich offers the highest levels of reliability, scalability, extensibility, compatibility, and security. MediaRich also prepares websites to take advantage of the coming generation of mobile appliances. For more information about MediaRich, visit *www.equilibrium.com*, or contact Equilibrium directly.

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About Equilibrium

Equilibrium, the world leader in media processing since 1992 when it released the first automated graphics processing software, DeBabelizer®, now leads the monetization of the next-generation Internet and mobile video revolutions. The patented, high-powered MediaRich® engine enables real-time personalization and delivery of music, images and video to website, wireless and portable devices. Equilibrium offers breakthrough cross-platform technology solutions featuring interoperability and integration for the workgroup, enterprise and web-server, delivering the same CORE technology for cross-platform interoperability and integration virtually anywhere. Equilibrium MediaRich for SharePoint is the only self-service Digital Asset Management (DAM) software that is seamlessly integrated within SharePoint. Equilibrium is a Microsoft Gold Partner. The EQ Network can automate personalized video delivery and monetization via advertising from any web video.