

An Oracle White Paper
March 2011

Oracle Real User Experience

Executive Overview

This white paper discusses Oracle Real User Experience Insight (RUEI) from a technical perspective. The objective of this document is to provide more information concerning product architecture, technical specifications, and some practical information on configuration and deployment considerations.

For more information, consult the *Oracle Real User Experience Insight User's Guide*, the *Oracle Real User Experience Insight Installation Guide*, or contact your Oracle representative.

Internet, Extranet and Intranet

Internet

The usage of the Internet continues to grow. The Internet is a strategic channel for virtually every aspect of today's businesses. While companies are looking to explore online opportunities, associated risks need to be controlled. Substantial revenue is at stake, as well as organizational reputation.

Extranet

Supply chain integration, VPN, and Web services are extending the scope of Extranet applications as companies are integrating their business and back-office channels.

Intranet

Back-office applications (including ERP solutions) are increasingly being deployed using the HTTP(s) protocol. This allows organizations to lower the total ownership cost because application maintenance is simplified, and hardware resources are centralized. As a result, the Intranet has become a very cost-effective platform to deploy internal applications.

Oracle Real User Experience Insight

Oracle Real User Experience Insight (RUEI) is designed for measuring, analyzing, improving, and controlling the availability and performance of all of the above deployment scenarios, including E-business applications, Web transactions, and ERP systems.

Note that in this paper, the term “Web applications” is used to refer to all applications that are deployed on the HTTP(s) protocol.

Measuring Real-User Performance

Typically, in order to control the performance and success of a Web application, a number of Key Performance Indicators (KPIs) are defined. The following are the most commonly used KPIs:

- End-to-end response times for pages and individual objects (URLs).
- Server and Internet/network response times.
- Error messages (both technical and functional).
- End-user behavior, number of aborts, and so on.

To follow up on the above KPIs, and to obtain a realistic view of the status of Web applications, organizations need to measure real-user experience. In order to make this possible, a number of requirements can be identified.

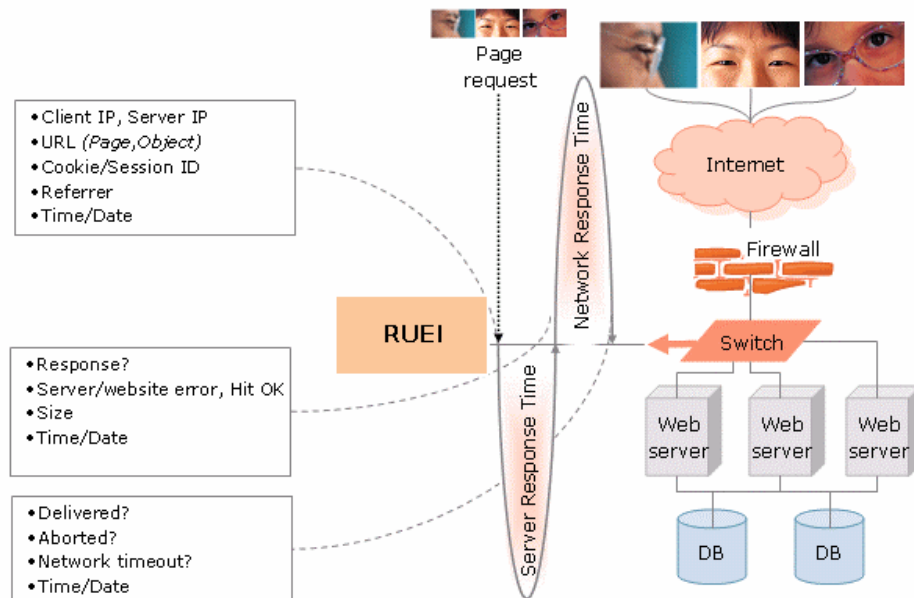
First, traffic from *all* users must be monitored. This is critically important because the information is used to cross reference your performance data and users groups which, in turn, can be grouped on location, department, type, status, and so on.

Secondly, the data collection method must be 100% non-intrusive. It is not acceptable to disturb the current service by adding extra load on a Web server, or by installing software agents that will affect performance.

Furthermore, organizations do not want to change their current applications or infrastructure. When a new application release is deployed, or when an additional Web server is added, there must be no (or very limited) changes to the monitoring environment.

Network Protocol Analysis (NPA)

Typically, RUEI is installed before the Web servers, behind a firewall in the DMZ (as shown below). The data collection method is based on Network Protocol Analysis (NPA) technology. This data collection method is explained below.



When an object is requested by a visitor, RUEI sees the request and starts measuring the time the Web server requires to present the visitor with the requested object. At this point, RUEI knows who requested the page (IP client), which object was requested, and from which server the object was requested (IP server).

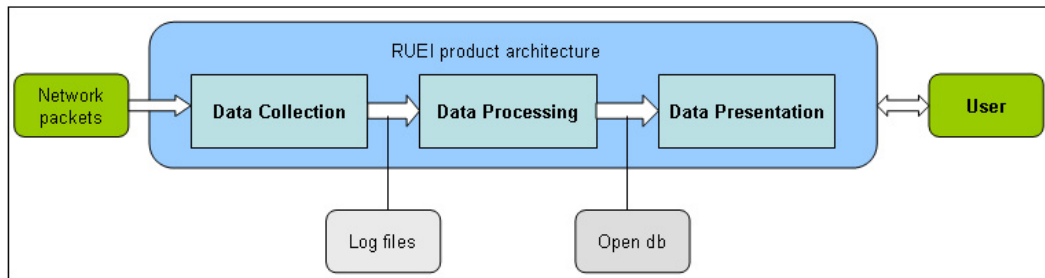
When the Web server responds and sends the object to the visitor, RUEI sees that response, and stops timing the server response time. At this stage, RUEI can see whether there is a response from the server, whether this response is correct, how much time the Web server required to generate the requested object, and the size of the object.

RUEI is also able to see whether the object was completely received by the visitor, or if the visitor aborted the download (proof of delivery). Therefore, RUEI can determine the time it took for the object to traverse the Internet to the visitor, and can calculate the Internet throughput between the visitor and the server (connection speed of the visitor).

Rather than defining only a representative usage of your Web site, RUEI unlocks your customers' experience while it gathers performance information. This is possible because RUEI sees exactly how your visitors browse and experience your Web site.

Product Architecture

RUEI is based on a three layer product architecture. The three layers are data collection, data processing, and data presentation.



The following sections discuss the three layers in more detail, as well as some deployment options.

1. Data collection

The Data Collector is responsible for acquiring raw data and delivers this to the Data Processor. Data can be collected from multiple sources. Using this setup, a RUEI configuration can be deployed as a fully scalable solution.

There are two common ways of attaching a RUEI Collector to the network: it can be connected to the copy port of a switch, or it can be connected using a dedicated network tap¹. Network taps have the additional security benefit that they work as read-only connections.

To read HTTP(S) data streams, a proprietary software module reassembles TCP/IP packet streams. Therefore, the operation system's TCP/IP stack is disabled for those network interfaces that are used to collect data.

Because these network interfaces do not have an assigned IP number, and the software using these network interfaces does not have a functional IP stack, RUEI is not able to respond to incoming traffic over these network interfaces. This makes RUEI “invisible” to the monitored networks, and completely secure.

¹ When capturing data with a network-tap device, prevent the use of a cascaded-taps configuration.

Data logging

When the Data Collector has been installed and configured, the network traffic is directly recorded.

Security aspects

To read HTTP(S) data streams, a proprietary software module re-assembles TCP/IP packet streams. Because the data collectors do not have an assigned IP number, and the software using these data collectors does not have a functional IP stack, RUEI is not able to respond to incoming traffic received from the data collectors. This makes RUEI “invisible” to the monitored networks, and completely secure.

Data collection can be configured to log encrypted data (HTTPS). To facilitate this, a copy of the Web server’s private SSL keys needs to be set up in the Collector. In addition, RUEI can be configured to omit logging of sensitive data in POST URL arguments, HTTP headers, cookies, and the content of URLs: so-called *masking*.

2. Data processing

The processor converts raw data into relevant OLAP datasets (or views). At installation time, the correct views are defined and configured. Page identification within RUEI is based on applications. Essentially, an application is a collection of Web pages. This is because pages on a Web site are typically bound to a particular application. For each page that the system detects, it uses the available application definitions to assign a name to it. Note that information about any pages that could not be identified using these definitions is discarded, and, therefore, not available through reports and the Data Browser.

3. Data presentation

The data presentation is performed by RUEI’s analysis and reporting environment. This is a Web-based information portal that can be accessed from any supported browser.

Standard functionality in this interface is the possibility to create reports, and to perform advanced statistical comparisons. This is available through an interactive browser with click-through selection on all aspects, full-text search, one-click create report button, printing ability, and various export formats.

Data correlation can be performed across the following dimensions:

- Period (year, month, week, day, hour, 5 minutes).
- Client (country, provider, provider network, city, client IP).
- Server location (IP address).
- URL (site, Web site, name, name and POST or GET arguments).

- Page (application, page group, page).
- Customer name (optional).

Graphs and value lists can easily be exported to spreadsheet applications (such as Microsoft Excel). It is also possible to configure RUEI to periodically send reports by E-mail to anyone of choice.

Authorization

An authorization system allows you to define a set of roles with different privileges.

DEPLOYMENT OPTIONS

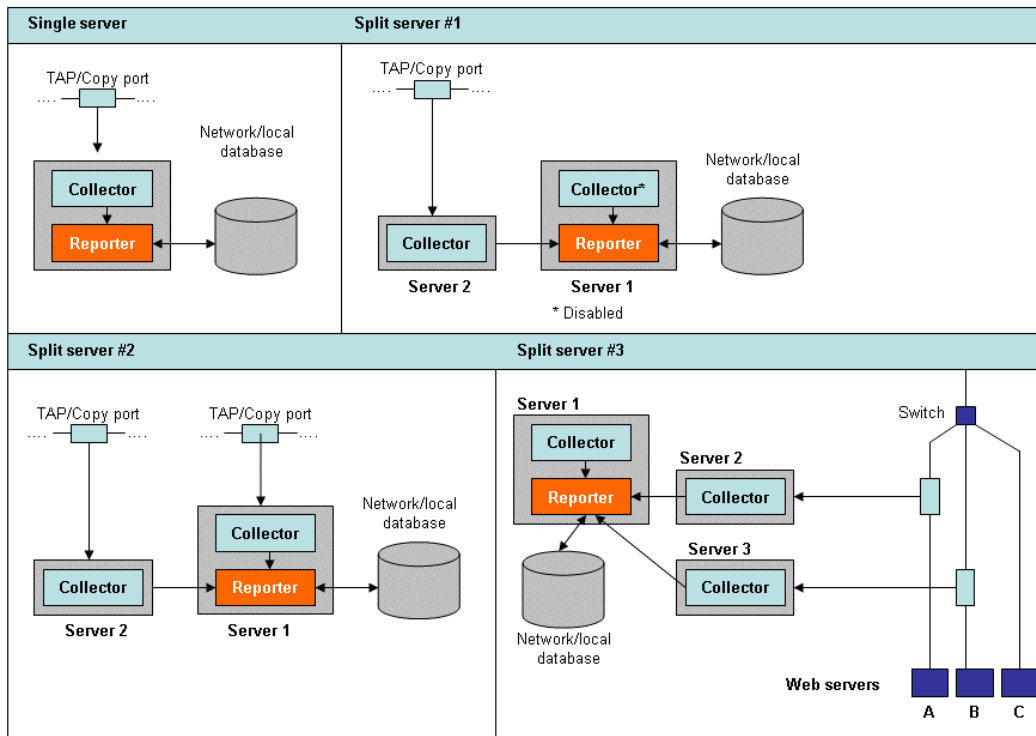
RUEI can be deployed in two different ways:

- **Reporter**

This is the standard installation option, and is the simplest to install and configure. Here, the Reporter provides a browser-based interface to the collected data. Note that each Reporter installation also contains a local Collector instance. The Reporter can either be configured to just process information gathered by this local Collector (this is, a single-server configuration similar to the one shown below), or can (optionally) be configured to receive information from additional Collector installations.

- **Collector**

If a RUEI system is installed as a Collector, it submits the data it gathers to a Reporter system. Multiple Collectors can be attached to the same Reporter. Configuration #1 below is an example of a single Collector split-server configuration, while Configuration #2 is an example of a split-server configuration using two Collectors. Note that a direct network connection is required between the Collector(s) systems and the Reporter system.



Split-server configuration #3 shows an example of a deployment in which both data lines are monitored in the same reporting environment. Note that this deployment assumes that the traffic on each line is mutually exclusive. It also shows an example of a deployment used for security reasons. While the traffic from Web servers A and B are monitored and reported, the traffic from Web server C is not. That is also the reason why the Collectors are not placed above the switch.

For security reasons, it is recommended that access to each Collector's Web interface be limited to the internal network, and not the DMZ. This is to prevent unauthorized resetting of the system. Similarly, you may want to locate the Reporter system inside the internal network to maximize its security. The Collector's data gathering ports should be in the DMZ.

Local and Remote Database Installations

The data available via the Reporter system is stored in an Oracle database. This database can reside locally on the Reporter system, or on a remote database server (such as a database cluster).

The use of a remote database server provides a number of potential advantages over a locally installed database. In particular, it offers easier integration with existing security and back-up

policies, as well as improved performance through the use of dedicated servers. Currently, RUEI supports the Oracle 11g database.

Failover Reporter and Collector Systems

It is possible to configure passive failover Reporter and Collector systems that will seamlessly take over processing in the event that the primary system is not available. In this way, a high level of operational reliability is achieved.

At server level, a crossover cable connects the primary and secondary systems. As long as a regular "heartbeat" continues between the primary and secondary servers, the secondary server will not initiate processing of traffic. However, the secondary server will immediately take over the processing task of the primary server as soon as it detects an alteration in the "heartbeat" of the primary server.

Installation

RUEI systems can be installed on Oracle Enterprise or RedHat Enterprise Linux 5 systems. It is *strongly* recommended that RUEI is only installed on dedicated systems. The procedure and requirements for installing RUEI are fully described in the *Oracle Real User Experience Insight Installation Guide*.

Single-server configuration

Required network connections: one copy (SPAN) port connection and one normal network connection as follows:

- For connection of the data collector to the Web infrastructure. Per monitored environment, a connection to the relevant copy (SPAN) port or network tap. These connections do not have network addresses.
- One connection to the customer user network. This connection does have a network address, and is used for accessing the Web-based Reporter system.

Split-server configuration

The required network connections are one or more SPAN connections and one normal network connection per data collection server, and at least one normal network connections per presentation server as follows:

- Per connection of the Data Collector on the Web infrastructure. Per monitored environment, a connection to the relevant copy (SPAN) port.
- For a separate presentation server: one connection to receive information from the data collection servers, plus one connection to the customer network. These may be combined.

Required network resources: two IP addresses for the presentation server, and one IP address per collection server as follows:

- An assigned fixed IP address for Web browser and login access to the presentation server.
- Access from the user network to the RUEI presentation server: Web browser access to port 80 (HTTP) or 443 (HTTPS).

Conclusion

RUEI is a solution for monitoring Web traffic through Network Protocol Analysis (NPA). Typically, it is installed before the Web servers, behind a firewall in the DMZ. The RUEI data collection method is based on NPA. RUEI is “invisible” to the monitored networks and completely secure.

Installation of a RUEI system requires no changes to a Web infrastructure or website content. A standard RUEI system can be operational within an hour.

RUEI provides an easy-to-use browser interface where you can correlate different information in a simple way. To create reports, you simply select an interesting view within the browser interface, and click a single button. Information is directly available, and provides you a complete insight into all performance aspects of all (object) transactions between your Web infrastructure and your visitors.



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