



**Rational** software

**Automatically create and generate  
reports using IBM Rational Portfolio  
Manager software.**

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### **Introduction**

It's late Friday afternoon and you're wrapping up the day, ready for the weekend. You get a frantic call from your boss. He just received a call from your division's executive looking for data on a specific group of projects in the portfolio. In months past, this report would take you the entire weekend to generate. Now, with the IBM Rational® Portfolio Manager, Version 7.1 application, this report can be generated automatically with a few clicks of the mouse.

### **Reporting methods**

Reporting on what has happened and where things currently stand is an important aspect of any project manager's duties. In IBM Rational Portfolio Manager, this has traditionally been done through two methods:

- 1. Using the proprietary reporting tools within Rational Portfolio Manager*
- 2. Exporting a copy of the online analytical processing (OLAP) pivot reports and using third-party tools such as the Microsoft® Excel application*

With the release of version 7.1 of Rational Portfolio Manager, there is now a third option: access to an external relational database that's available with Rational Portfolio Manager and that allows you to view and manipulate a copy of the data. This method allows you to utilize tools such as IBM Lotus® 1-2-3®, IBM DB2® Alphablox®, Crystal Reports, Cognos, Microsoft Excel or Business

Intelligence Reporting Tools (BIRT). Besides giving users the flexibility to use existing reporting tools, business intelligence tools or open database connectivity (ODBC) data-sourced tools, this method has some additional benefits, including:

- *Improved performance.*
- *Technology based on open architecture standards.*
- *Secure access to Rational Portfolio Manager data.*
- *Fully documented staging tables and data warehouse stars.*
- *Data warehouse stars covering current Rational Portfolio Manager pivots (except assets).*
- *Access to data without requiring middleware.*
- *Use of existing tools and replication technologies.*
- *Separation of report generation CPU usage from daily operational database CPU usage.*
- *The ability to automatically update the relational database.*
- *Deltas (default).*
- *The ability to transfer all data.*
- *Residence on a separate server.*

These benefits result in the capability of creating ad hoc reports and generating the resulting data faster and easier than ever before.

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A data warehouse ... contains the raw material for management's decision support system. The critical factor leading to the use of a data warehouse is that a data analyst can perform complex queries and analysis, such as data mining, on the information without slowing down the operational systems...

While operational systems are optimized for simplicity and speed of modification (see [online transactional processing] OLTP) through heavy use of database normalization and an entity-relationship model, the data warehouse is optimized for reporting and analysis (online analytical processing, or OLAP). Frequently data in data warehouses are heavily denormalized, summarized or stored in a dimension-based model. This is not always required to achieve acceptable query response times, however.<sup>1</sup>

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### Definitions

There are two basic building blocks: data warehouse and star schemas (also known as stars). These building blocks are the basis for this reporting solution. The online encyclopedia Wikipedia defines data warehouse as “the main repository of an organization’s historical data, its corporate memory” (see sidebar).

Ralph Kimball, one of the foremost authorities on data warehousing, provides a much simpler definition of what a data warehouse is. He says it’s “a copy of transaction data specifically structured for query and analysis.”<sup>2</sup>

The next building block that needs to be defined is how data is stored in the data warehouse. The schema used is called a star schema. Michael W. Cain describes this star schema as containing “a centralized table known as the fact table, and is surrounded by highly normalized tables known as dimension tables. The name ‘star schema’ reflects the fact that the data model appears as a star (the dimension tables appear as points of a star surrounding the fact table).”<sup>3</sup> Shown in figure 1 is a stylized example of what a star looks like.<sup>4</sup>

Figure 2 is an example of an actual star.

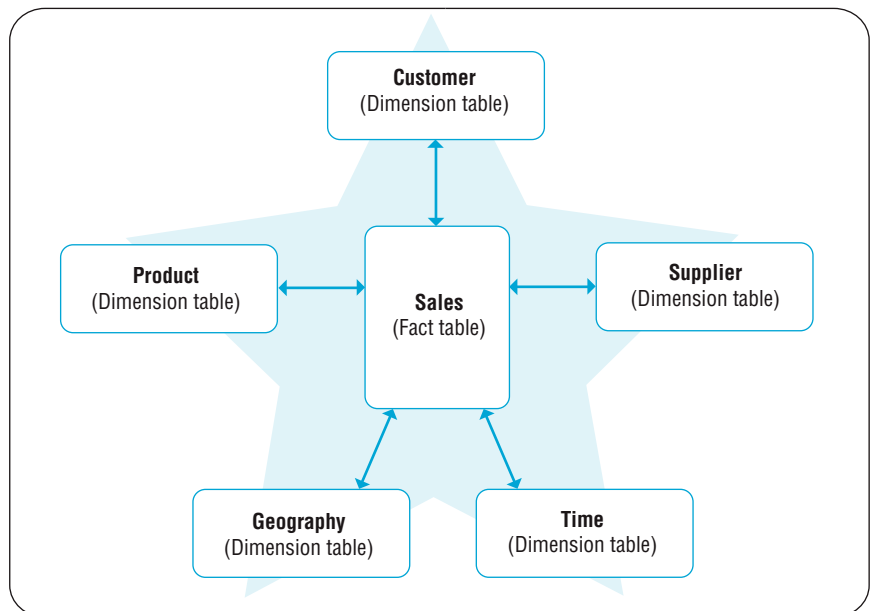


Figure 1: Example of a star

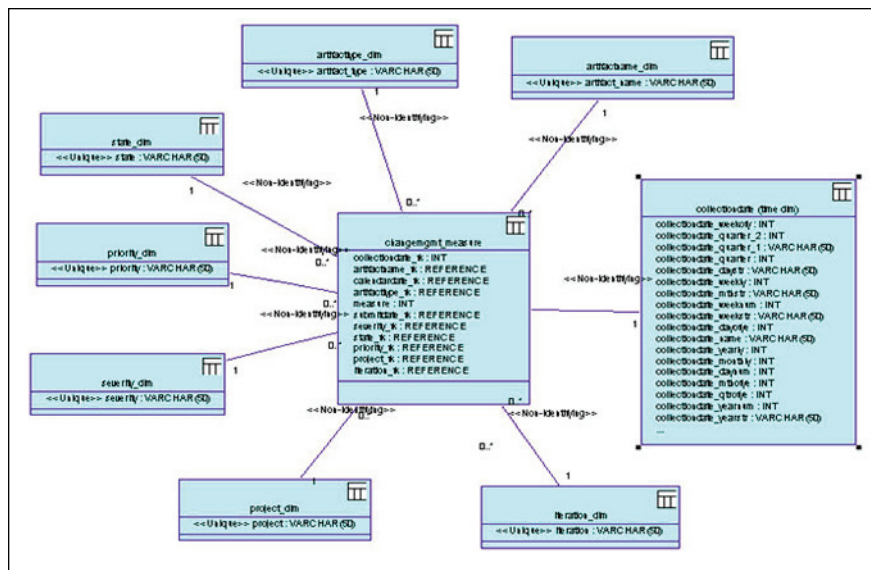


Figure 2: Real-world example of a star

Now that we've defined the data warehouse and star schema building blocks, how do these components actually function in Rational Portfolio Manager?

In its simplest form, Rational Portfolio Manager uses a two-stage process to get data that can be accessed by the various reporting tools into the data warehouse. The first stage is called, appropriately enough, the internal staging area. Extract-Transform-Load (ETL) is the process used to move the data from one location to the next. The second stage is the data warehouse itself. Figure 3 shows how these stages are related.

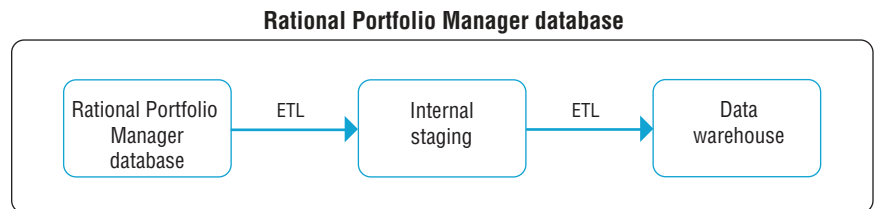


Figure 3: Data transfer structure

The internal staging area provides a temporary location for cleansing the data as well as creating a normalized view of the data. The process to create the normalized view converts the Rational Portfolio Manager database from a proprietary format into a relational database format. As part of this process, data that cannot be converted is not transferred. Notification is sent to the project manager that there are some issues/problems with the data. Until the issue with the corrupt data is resolved, the data is not transferred to the data warehouse. The second stage is the data warehouse itself; this is the area from which reports can be run. It contains views that allow secure access to the Rational Portfolio Manager data. It contains two sets of tables:

- **Dimensions**—contains data types that are likely to remain the same or vary only slowly. These tables are what a report would be elaborated on, either by association to facts or by enumeration. These tables would contain data such as project name.
- **Facts**—contains data for an event, which occurs at a given date and time. The data also has measurable quantities associated with it, and is associated with one or more dimensional values (i.e., dimension tables). This would contain data such as project actuals.

Understanding the structure of the data warehouse will help when it comes to writing ad hoc reports. Now let's discuss how the data gets into the data warehouse.

### **Scheduling updates**

One of the problems with reporting on data that is not in the operational database is how to keep it up to date. Rational Portfolio Manager uses the database toolset's scheduler to automate a trigger to extract the data to the internal staging area. This can be set up on a several-times-per-day, daily, weekly or other preset schedule. When this ETL is triggered, it does two things: cleans the staging area of the previous collection, and transfers a copy of the data from Rational Portfolio Manager to the internal staging area. If this is the first time that data is being transferred, it will transfer all the data; otherwise, it transfers the delta (i.e., changed project or new project data) from the previous collection. Once the data has been transferred to the internal staging area, the processing to clean and normalize the data is started. During this process the ETL also checks for corrupted data. After this has been completed, the ETL is triggered to transfer the data to the data warehouse.

Once the data is in the warehouse, another common problem that needs to be resolved is how to keep the data secure. Rational Portfolio Manager can use two methods of authentication, either Lightweight Directory Access Protocol (LDAP) or database authentication.

## Security

The first step in setting up the security parameters requires the database administrator (DBA) to create a database user for each user who will have access to the data warehouse. This must be done whether you use LDAP or database authentication. The next step is to determine what security rights the user will have, as there are two different models:

- **Model 1:** *User can view data based on his or her project assignments in Rational Portfolio Manager.*
  - *This is the most desired model, as security is controlled through the views.*
  - *The model allows you to build structured query language (SQL) statements against the database views.*
  - *Users must exist in Rational Portfolio Manager and must be in the user cross-reference table.*
  - *Only row-level security is available; not column-level security.*
  - *The DBA will need to set the following security rights:*
    - *Deny read-only rights to all tables.*
    - *Grant read-only rights to all views.*
  
- **Model 2:** *Users can view all data in the warehouse.*
  - *This model allows you to build SQL statements directly against the fact and dimension tables.*
  - *It also allows you to build views that limit the columns returned (these views can then be used by users in model 1).*
  - *No security is applied to the tables.*



- Database user is required, but does not require a Rational Portfolio Manager user.
- This kind of access should be granted only to very privileged database users.
- The DBA will need to set the following security rights:
  - Grant read-only rights to all tables.
  - Grant read-only rights to all views.

There are some additional considerations if using LDAP authentication. You must use LDAP authentication when the Rational Portfolio Manager middleware is also using LDAP authentication. If the LDAP username is not a valid database username (e.g., contains nonalphanumeric characters such as periods, ampersands, @ signs, etc.), then the alternate ID attributes (name and password) must be set. This set of attributes is located in the individual resource record in Rational Portfolio Manager (see figure 4).

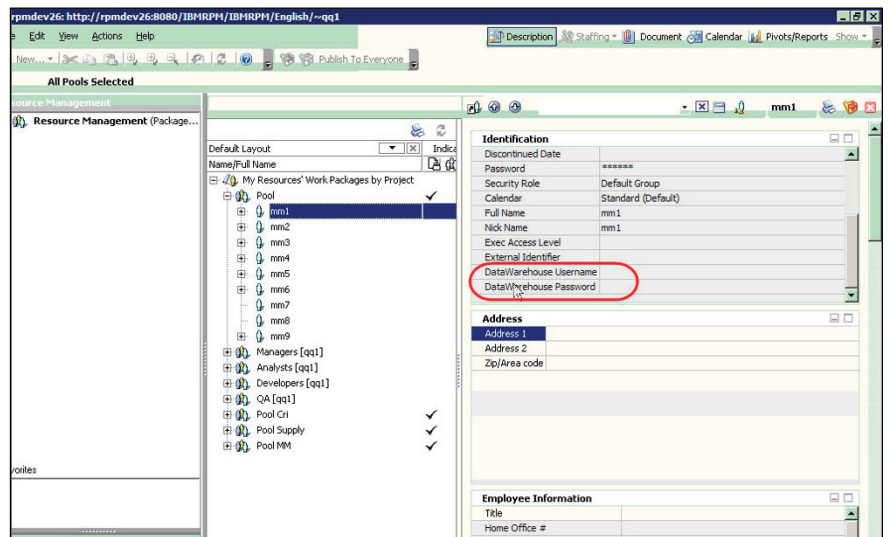


Figure 4: Identification portlet showing the attributes for the data warehouse

### Accessing data in the data warehouse

Once the data warehouse has been created, populated and its accessibility determined, the next decision point is around what tool or tools to use to retrieve the data from the warehouse.

Continuing with the wide variety of options available with this data warehouse, there are two methods for accessing the data:

- *You can use a third-party or in-house reporting tool or tools.*
  - *You can connect to the data warehouse using a preferred reporting tool.*
  - *You can create third-party or in-house reports.*
  - *You can view the reports from an internal Web site or from a URL portal on the My Portal page in Rational Portfolio Manager.*
- *You can use the Rational Portfolio Manager out-of-the-box Common Reporting solution.*
  - *You must deploy the Web application for Common Reporting and BIRT.*
  - *You can run reports on all of the projects from the My Portal page.*
  - *You can run reports on individual projects by using the Portfolio Viewer in the Work Management view.*

### Third-party reporting

Let's take a look at the first option: *You can use a third-party or in-house reporting tool or tools.* The data warehouse supports three different solution sets. Each of these solution sets provides a unique set of capabilities. The solution set families, with examples of the tools that fit into each family, are listed below (this list is representative, not exhaustive):

- *Reporting tools*
  - *BIRT, Crystal Reports, Actuate, etc.*
- *Business intelligence tools*
  - *DB2 Alphablox, Cognos, etc.*
- *Tools using ODBC data sources*
  - *Lotus 1-2-3, Microsoft Excel, Microsoft Word, etc.*

This option allows you to connect directly to the data warehouse and use the full functionality of the tool of choice; although this option will not allow you to view reports from within the Rational Portfolio Manager Portfolio Dashboard.

#### **Out-of-the-box Common Reporting**

For the second method: *You can use the Rational Portfolio Manager out-of-the-box Common Reporting solution.* Rational Portfolio Manager is delivered with an open source report run-time program that is part of the Eclipse project. This program is called BIRT. This is an excellent option if you do not already have a reporting solution, or if you want to take advantage of using the tool itself to drive what data is visible. The Common Reporting solution provides the following:

- *A repository to store reports*
- *A generic interface to multiple third-party reporting tools (using URLs)*
- *A report administration interface*

If you use this method and want to develop your own reports, you will need to download the designer from <http://www.eclipse.org/birt/phoenix/>. This option will allow you to define and store reports. These reports can then be made available in the Rational Portfolio Manger Portfolio Dashboard.

The first thing you will notice is an icon on the Portfolio Dashboard (see figure 5). For veteran users of Rational Portfolio Manager, this is a new icon available with version 7.1. This is where you will access all of the reports that have been registered in the Common Reporting repository. If you've registered any third-party tools and reports in this repository, they will show up here as well (see figure 6).

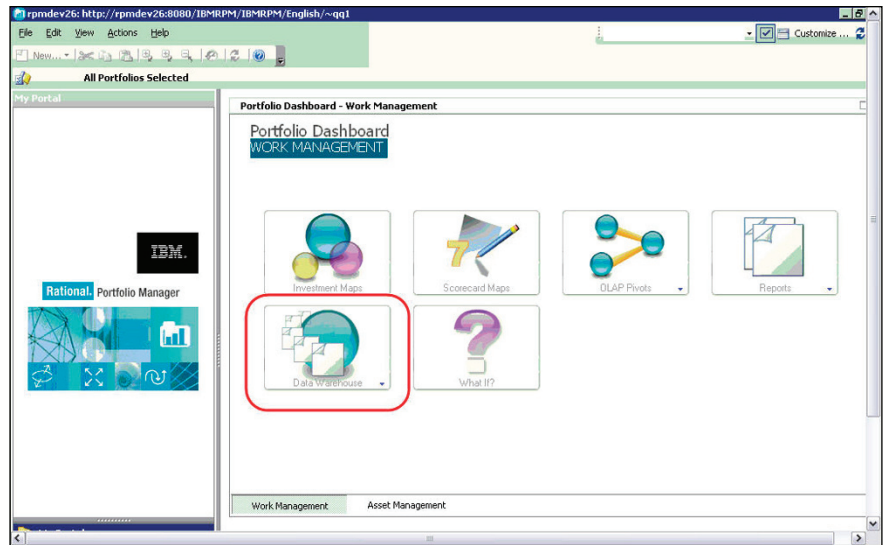


Figure 5: Data warehouse link on the Portfolio Dashboard

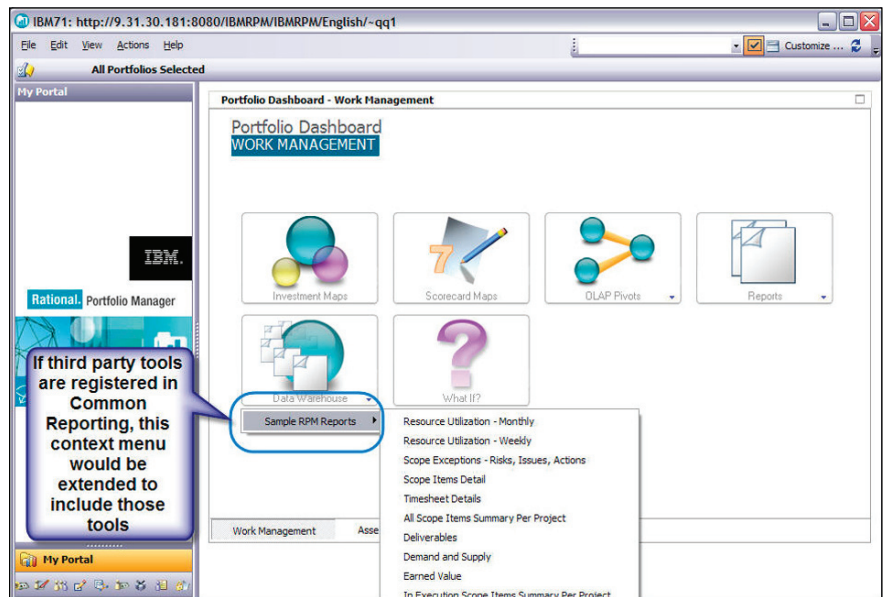


Figure 6: Listing of reports for the data warehouse

The list of reports will reflect the security role, as well as the report security, that has been applied. If you are running the Portfolio Dashboard from the My Portal view, the generated report will reflect the projects and proposals that are in your portfolio based on what filters have been applied (see figure 7). You can also run these reports from the Work Management view. This works the same way it currently does with the OLAP pivots or the proprietary reporting method (e.g., what is selected—the folder or projects/proposals are evaluated for the report). The out-of-the-box sample reports are formatted to resemble the reports from the proprietary reporting method (see figure 8).

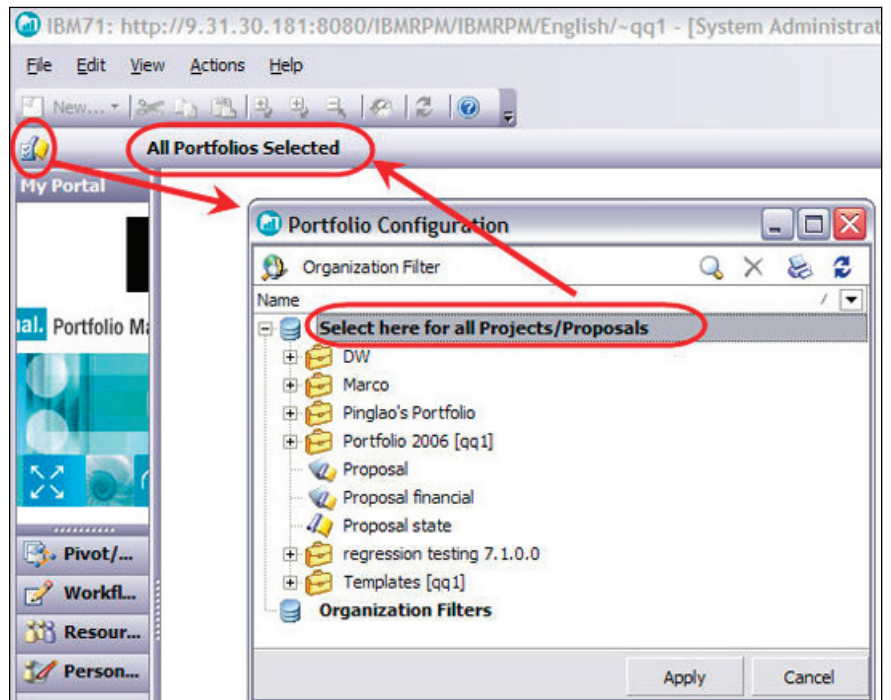


Figure 7: Filtering on the portfolio

ProjectMgr Full Name	Rank	State	Project	Available (h)	Sched. (h)	% Utilization
Month: 2007-4	500	None	Initiative for projectA [qq1]	168.00	0.00	0.00
ProjectMgr2 Full Name	Rank	State	Project	Available (h)	Sched. (h)	% Utilization
Month: 2007-4	500	None	Initiative for projectA [qq1]	168.00	0.00	0.00
cm1	Rank	State	Project	Available (h)	Sched. (h)	% Utilization
Month: 2007-5	500	None	MM for GE pivot	184.00	124.00	67.39
cm2	Rank	State	Project	Available (h)	Sched. (h)	% Utilization

Figure 8: Generated report

With the BIRT Report Viewer, you can enable the Table of Contents (TOC) to allow easier access to the data. Click the TOC icon located in the upper left corner (see figure 9). This TOC is hyperlinked to the data in the report.

**BIRT Report Viewer**

Showing page 1 of 1

**All Pending Scope Items Summary Per Project**

Project: 50019

Change Request	Qty	Ref #	Ext. Ref #	Proposed On	Proposed By	Target Date	Rank	State
Change Request		9566		5/22/07	qq1		500	Pending
<b>Total</b>	<b>1</b>							

Defect	Qty	Ref #	Ext. Ref #	Proposed On	Proposed By	Target Date	Rank	State
Defect		9564		5/22/07	qq1		500	Pending
<b>Total</b>	<b>1</b>							

Figure 9: Generated report with TOC enabled

### Common Reporting interface

Now that you've seen how to generate reports using Rational Portfolio Manager, let's take a look at the interface that is used to supply these reports. The Common Reporting solution provides a Web interface that is separate from Rational Portfolio Manager (see figure 10). This interface provides a location to manage your reports. There are three hyperlinks in the administration section for administrating the functions of this interface. These are:

- *Define the systems that will be used: Reporting System Management.*
- *Determine how the reports will be displayed in Rational Portfolio Manager: Folder Management.*
- *Establish which reports are registered in the system: Report Management.*

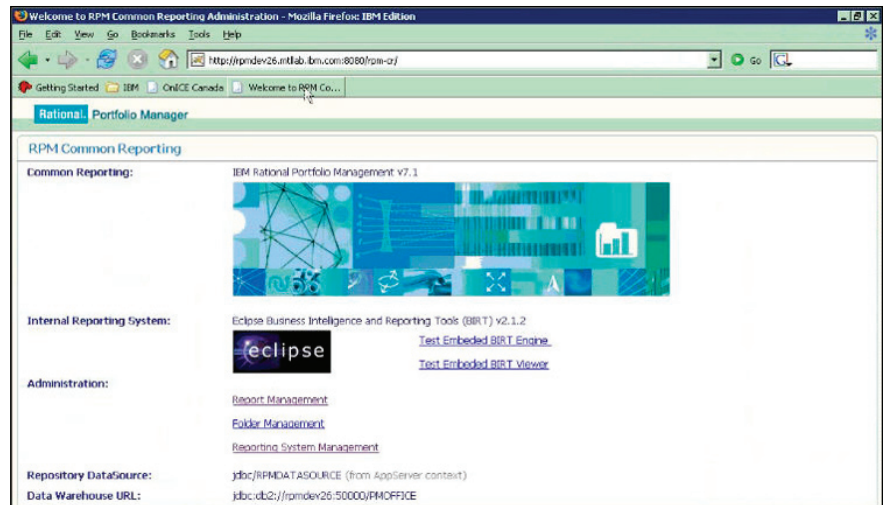


Figure 10: Common Reporting Web interface



With the 7.1 release of Rational Portfolio Manager, report writing and generation have become significantly easier. Now, you can use powerful reporting tools such as Crystal Reports or DB2 Alphablox. Through these reporting tools, disparate data can be joined to expand the data mining process. Trends can now be surfaced directly from the data without having to use a manual process. Since this solution resides on a separate database, the process of generating ad hoc reports is not affected by the performance of the operational database, thus improving efficiency.

### Summary

Your weekend is no longer at risk; you've gotten the report out to your boss, with the exact information he requested from the specific projects in the portfolio. This information included financial estimates as well as resource allocations and demands. You did not have to manually gather and evaluate this data prior to creating a customized report. Since all the data is already in the data warehouse, you can use the reporting tool or tools you're most comfortable with to create the ad hoc report. Although now that you have it, you might just want to have your database administrator include it in the Common Reporting interface so that your boss can run it himself the next time he needs it!

### For more information

To learn more about IBM Rational Portfolio Manager software, contact your IBM representative or visit:

[ibm.com/software/awdtools/portfolio](http://ibm.com/software/awdtools/portfolio)

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- 1 Wikipedia; March 30, 2007; [http://en.wikipedia.org/wiki/Data\\_warehouse](http://en.wikipedia.org/wiki/Data_warehouse).
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  - 4 Ibid.