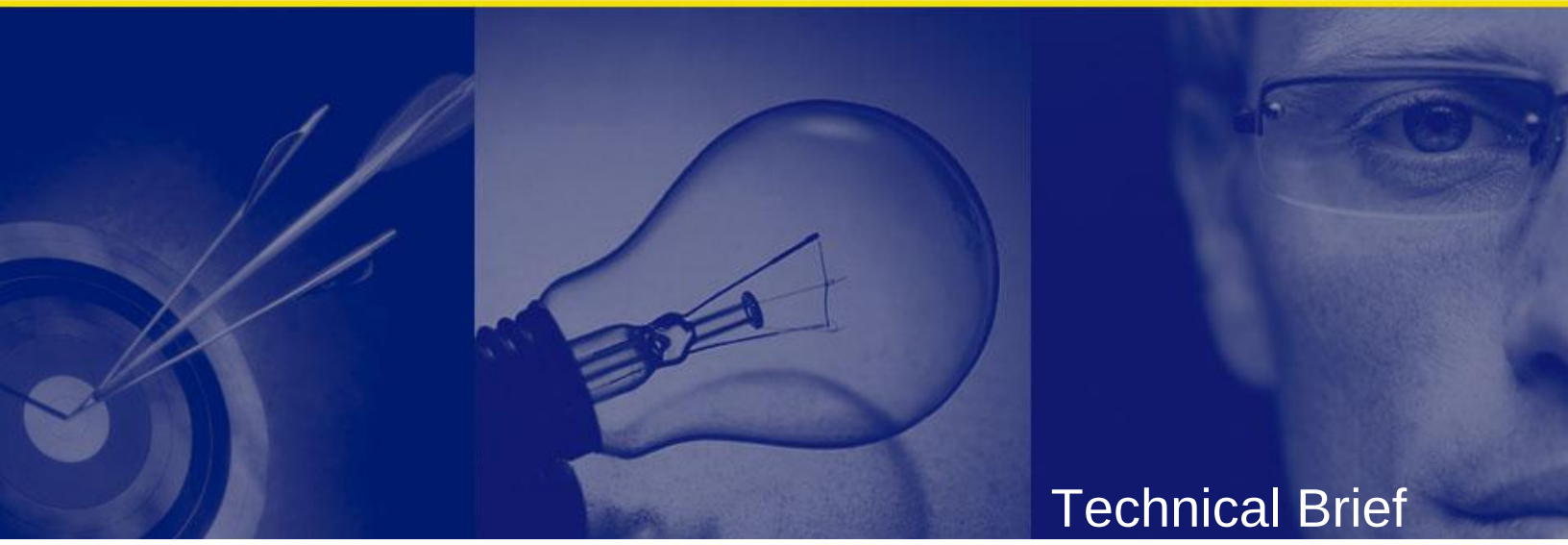
QUEST SOFTWARE®

Storage Capacity Management for Oracle Databases

Technical Brief



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Abstract

Effective capacity management in the Oracle database environment provides a wealth of benefits. Proper monitoring and accurate forecasting of database growth helps ensure that you have sufficient resources as your environment changes, such as when new applications go live or during seasonal surges in business. This can reduce the risk of performance degradation and downtime caused by not having enough disk space readily available—problems that would otherwise hurt user and IT staff productivity. And by enabling the most effective use of resources, capacity planning can reduce costs: you may be able to delay or even avoid the purchase of new hardware.

Many tools on the market help DBAs keep individual databases in shape, but effective monitoring and capacity planning requires an enterprise-wide perspective. DBAs need to quickly determine which databases have emerging issues that need immediate attention; they need to keep tabs on the growth of their databases, individually and collectively; and they need to accurately forecast change and growth.

Quest Software offers a comprehensive solution for monitoring and planning storage capacity across multiple Oracle databases: Space Manager with LiveReorg and its Capacity Manager feature. This technical brief explains how Capacity Manager can help your enterprise effectively monitor and plan for space capacity needs.

Introduction

The Need for Storage Capacity Management

A variety of tools on the market can help Oracle DBAs manage space use on each of their databases individually—reorganizing to reclaim wasted, added, or unused space; partitioning objects; creating tablespaces; and so on.

But today's Oracle DBA is challenged with managing multiple Oracle databases—sometimes hundreds of them, in multiple locations. Therefore, as much as they need to keep each individual database in shape, DBAs also need to maintain a broader perspective across all their databases. They need to be able to identify which databases require their attention first; predict and prevent problems like out-of-space conditions; identify space that is not being used so it can be reallocated; and determine the rate at which storage is being consumed. Without a clear picture of their overall data storage, there is no way for DBAs to identify whether they are getting a worthwhile return on their storage investment and to accurately plan for growth.

In short, DBAs need a comprehensive solution that provides both tools for managing individual databases and tools for capacity management across all their databases. Quest Software delivers that comprehensive, integrated solution with Space Manager with LiveReorg and its Capacity Manager feature.

Quest Space Manager with LiveReorg and its Capacity Manager Feature

Capacity Manager is a graphic, information-rich solution for monitoring and planning storage capacity across multiple Oracle databases. Capacity Manager alerts you to emerging issues across the enterprise, such as tablespaces that are low on free space, and visualizes how space is currently allocated. Moreover, you can accurately forecast future space needs based on historic growth rates, and you can even supplement Capacity Manager's historical data with business intelligence to evaluate likely or hypothetical growth scenarios.

As you identify storage issues with Capacity Manager, you can resolve them with Space Manager. With Space Manager, you can reorganize and restructure large, volatile databases with minimal application downtime. You can reclaim wasted, added, or unused space; resize objects for optimal space use; partition objects; repair chained rows; create tablespaces; and add or resize datafiles. And you can launch Space Manager in context directly from Capacity Manager when you identify a problem.

About This Document

This technical brief shows how you can use Capacity Manager to monitor space usage across multiple Oracle databases, predict their growth, and accurately plan for the future.

Storage Capacity Management: An Introduction

The Benefits of Storage Capacity Management

The goal of storage capacity management is to provide accurate forecasts about future resource requirements. Good capacity management offers the following benefits:

- **Reduced risk** – Capacity management enables you to ensure that you have sufficient resources as your environment changes—for instance, when new applications go live or when application demand changes.
- **Increased efficiency** – Accurate forecasting can help you prevent performance problems that would otherwise impact both users and IT staff.
- **Cost effectiveness** – Effective planning can help you defer expensive hardware upgrades. You can also make more informed storage purchases based on usage. For example, you can move objects that are not critical or that are rarely used to cheaper storage options.

What Questions Does Capacity Manager Answer?

Capacity Manager provides easy-to-read charts and tables that help you understand both the current status of your databases—including issues that require immediate attention—and their predicted growth. Capacity Manager answers all of the following questions:

Immediate Issues

- What storage issues need immediate attention?
- Which tablespaces will run out of space in the near future and when will this happen?

Current Status

- How much space is currently allocated and how much is free in databases, tablespaces, and datafiles?
- How is space allocated by segment type?
- What is the physical size of my databases, tablespaces, and datafiles?
- Which are the largest databases, tablespaces, and datafiles?
- Which tablespaces have an excessive allocation of free space?

Projected Growth

- Which are the fastest growing databases, tablespaces, and datafiles?
- How fast are all my databases, tablespaces, and datafiles growing?
- How much space will I need in the future based on current growth trends?
- Are planned resource purchases adequate for the space needs forecasted?

Capacity Manager answers these questions not just for one database at a time, but across groups of monitored databases, including groups based on your criteria, such as criticality, application type, or shared storage.

Assessing the Current Status of Your Databases

Capacity Manager enables you to easily understand the big picture of database health across a group of databases. To make management easier, you assign each of your databases to a Capacity Manager *repository*. A repository can include all databases in your system or a subset of databases that share storage and that should be monitored as a group. Capacity Manager provides a variety of information aggregated for all the databases in a repository, so you focus on any set of databases of interest to you.

Identifying Immediate Issues

First, you will want to see all emerging issues in all databases for which you are responsible. Capacity Manager aggregates this information on one screen and highlights issues, such as tablespaces that are about to run out of space and tablespaces that are low on free space, as defined by the thresholds you set. You can select an item to view more information about it at the bottom of the screen, or double click a row to drill down to even more detail.

Figure 1 shows the status of the databases in one repository at a glance. The four that need immediate attention are highlighted with a red "critical" icon, and several others that need attention less urgently are marked with a yellow "warning" icon.

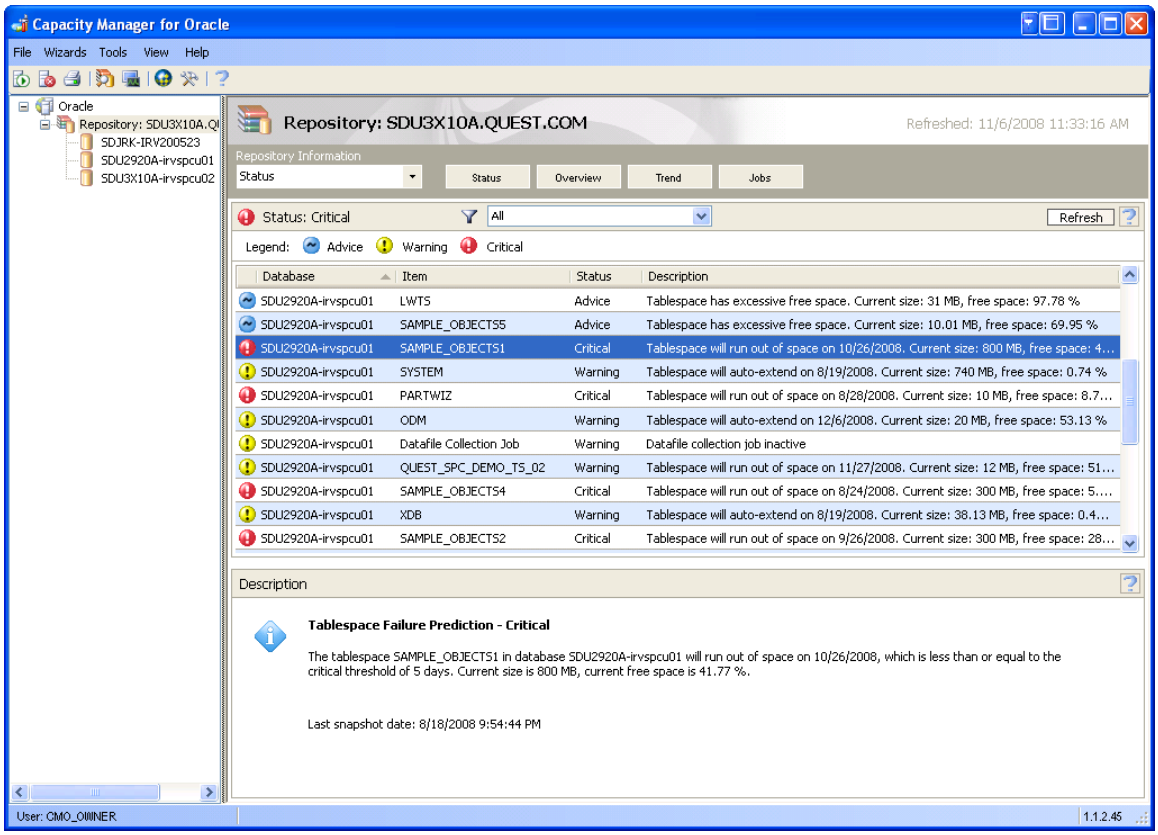

Figure 1: Identifying emerging issues at a glance

Assessing Current Status

Next, you can quickly assess the current space allocation across all the databases, as well as the individual space allocation for the largest databases.

Viewing Database Space: Allocated and Free

The pie chart in Figure 2 shows that just over half of all space in our repository is currently allocated, which is reassuring. But the bar chart on the right shows that VIS-alvlabu11 is by far the largest database and that, unlike the smaller databases, most of its space is already allocated—something to keep an eye on.

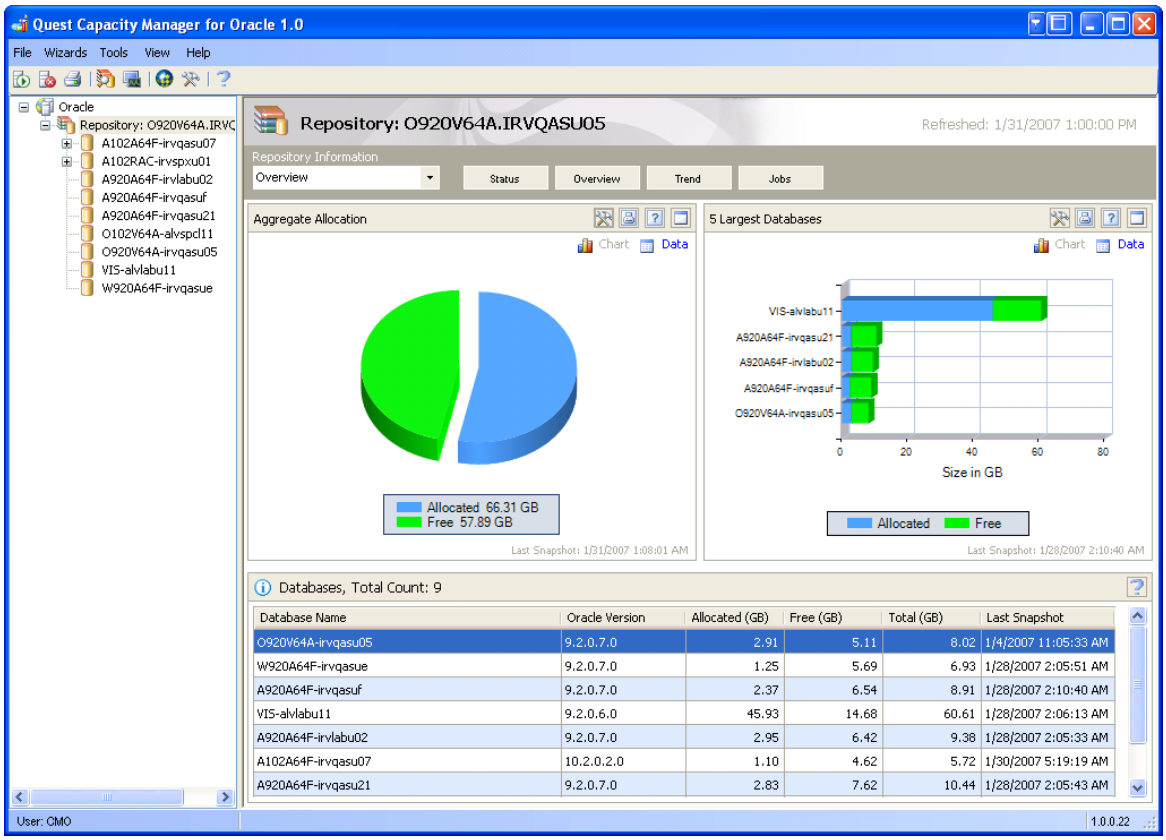

Figure 2: Database space allocated

Capacity Manager can also visualize relative space allocation by segment type, so you can determine how space is allocated to tables, indexes, and other items. For example, the chart might reveal that more space is allocated to indexes than to tables.

Viewing Tablespace Space: Allocated and Free

You can view similar information for the tablespaces in any individual database. For instance, the pie chart below shows that about 20% of tablespace space overall is free, but

the bar chart indicates that two of the largest tablespaces are nearly out of free space and therefore may require attention soon.

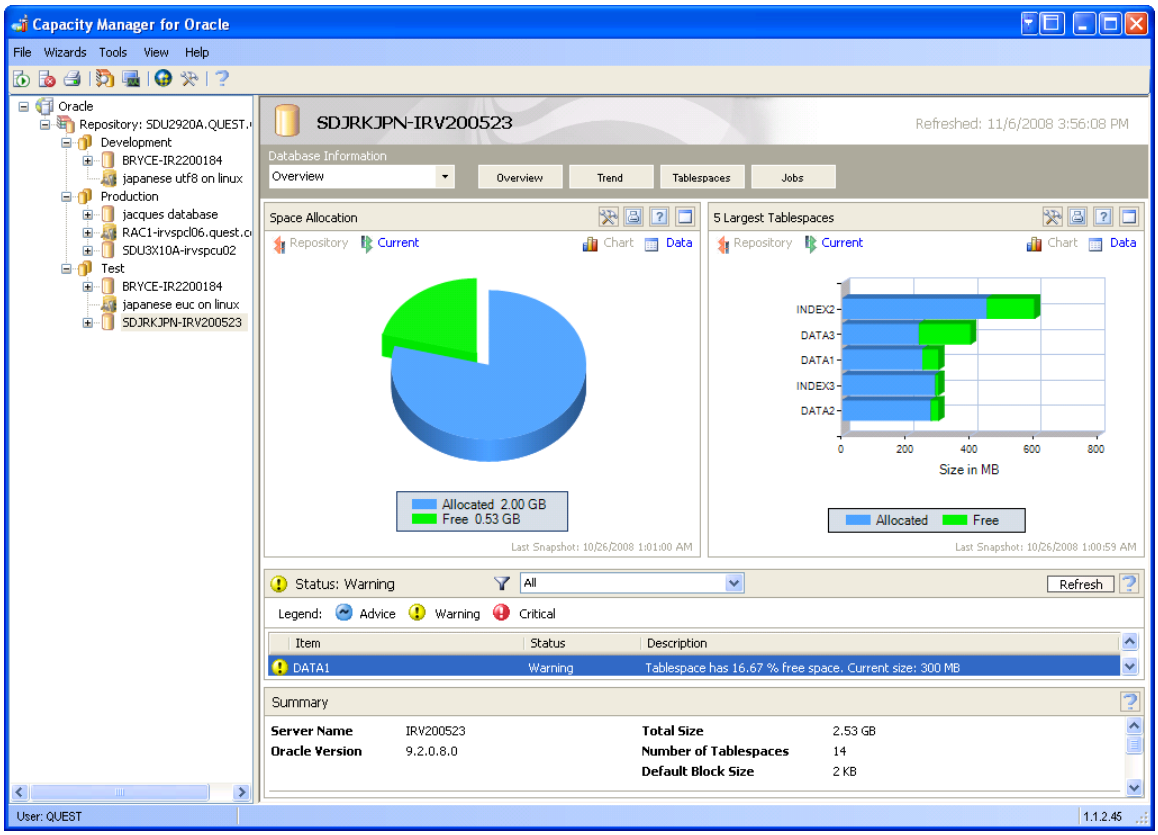

Figure 3: Tablespace space allocated, graph format

You can choose to view this information in data format instead of graphically, as shown below:

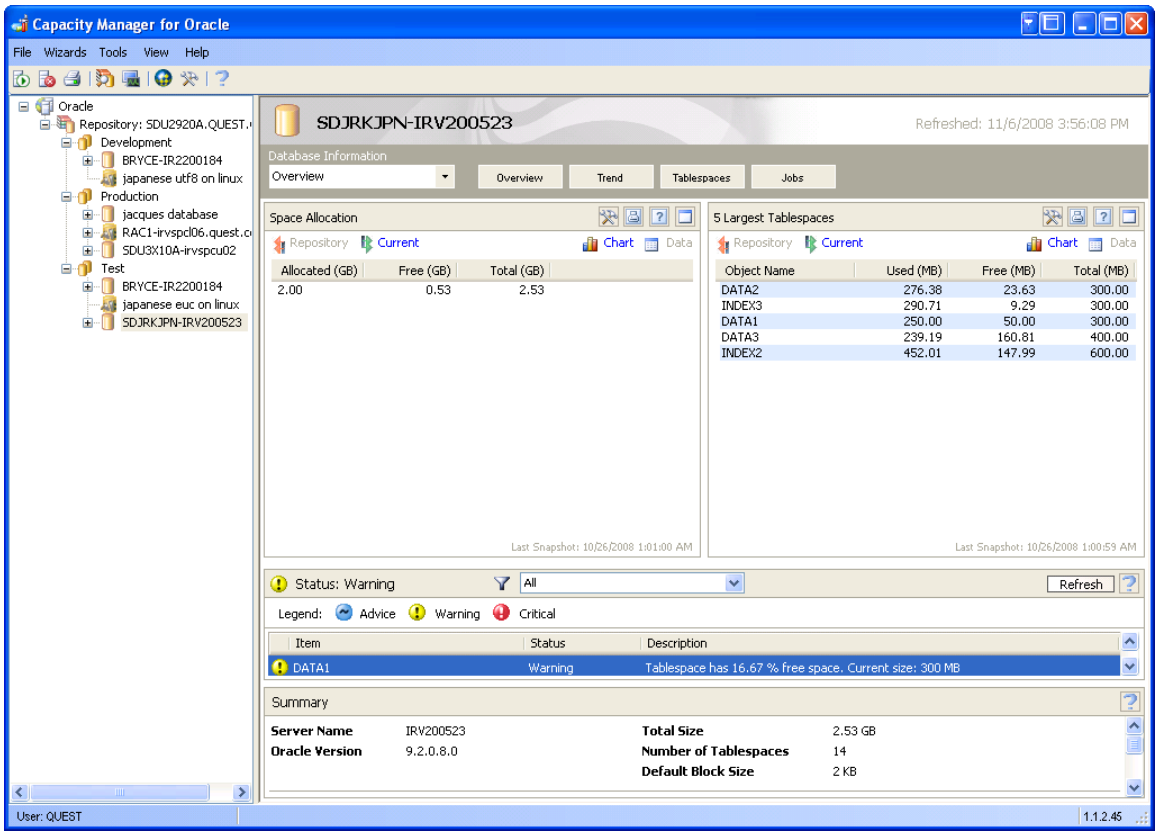

Figure 4. Tablespace space allocated, data format

Launching Space Manager to Remedy Issues

When you identify a problem, you can launch Space Manager in context directly from any Capacity Manager screen to get further information on individual segments and perform corrective action, such as space reclamation, reorganization, or restructuring.

Projecting Growth

Understanding your current situation is, of course, absolutely necessary. But capacity management requires identifying trends so you can plan for the future and avoid issues. Capacity Manager provides a variety of tools to help.

Understanding Current Trends

Capacity Manager charts the size of your databases over time and identifies the fastest growing databases. The Aggregate Growth chart below shows that our repository has grown slowly over the past year; however, its growth can be expected to accelerate over the coming months. The bar chart to the right shows that the largest database, jacque, is also the fastest growing database.

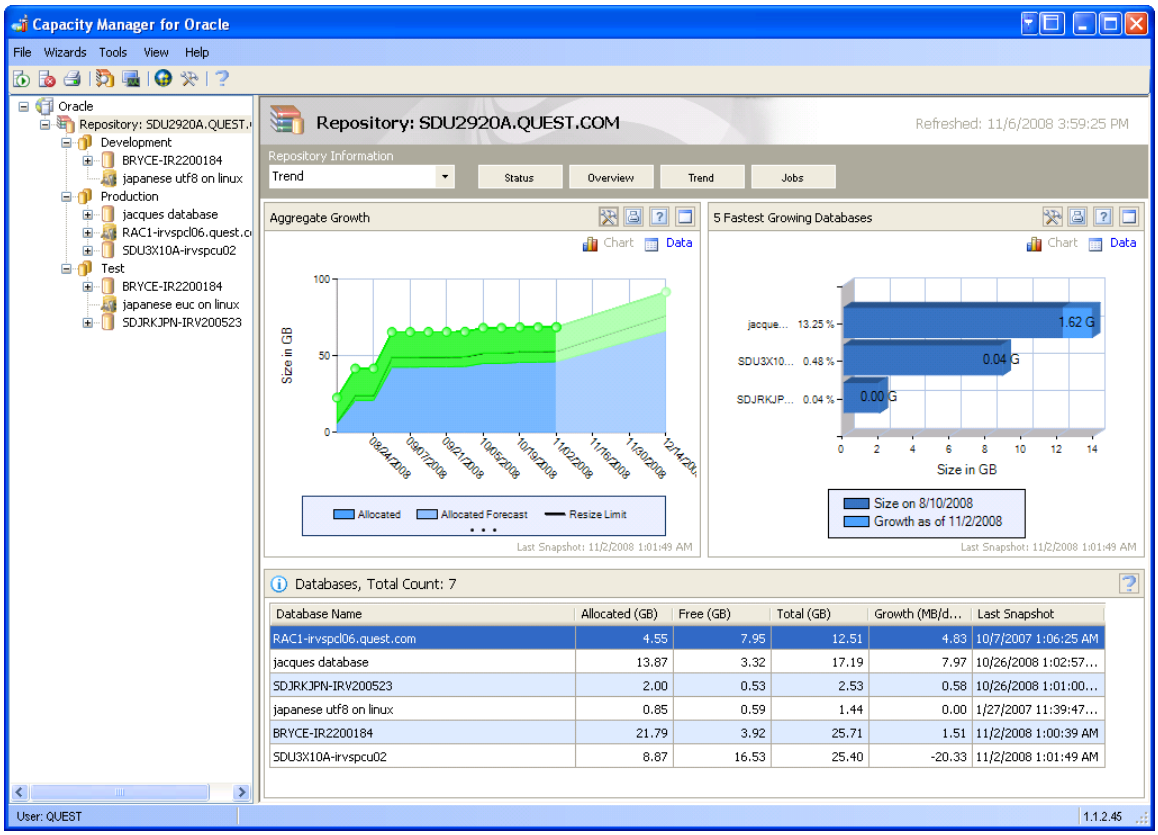

Figure 5: Repository growth over time and fastest growing databases

You can also view similar information about the fastest growing tablespaces.

Forecasting Growth

The next step in capacity management is to predict resource needs for the future. You can choose either of two forecasting methods:

- **Linear regression** — Future growth is estimated using a linear equation: projected growth is plotted with a straight line from the last snapshot date to the forecast date. This is the default method.
- **Fuzzy logic** — Future growth is estimated based on historic patterns. That is, projected growth is approximated to show how it might evolve out of the most common historic trends. Fuzzy logic produces more meaningful results when more historic data is available. Results may be less meaningful when only a few snapshots have been accumulated in the repository.

You can specify whether all data should be used in creating the forecast, or whether only recent data (such as the last 30 or 90 days) should be used.

You can also specify the forecast period. By default, Capacity Manager makes the forecast time period half as long as the sampling time period, but you can pick another time period. Or you can forecast the date a container will run out of space, reach a certain growth percentage, or attain a certain size.

Forecasting Space Usage

The forecast below predicts that database HRID will run out of free space on 11/26/2008, based on recent growth trends (1.20 MB/day). The bar graph to the right helps explain why: the fastest growing files have been experiencing rapid growth. Storage requirements are automatically calculated so you don't need to perform manual calculations.

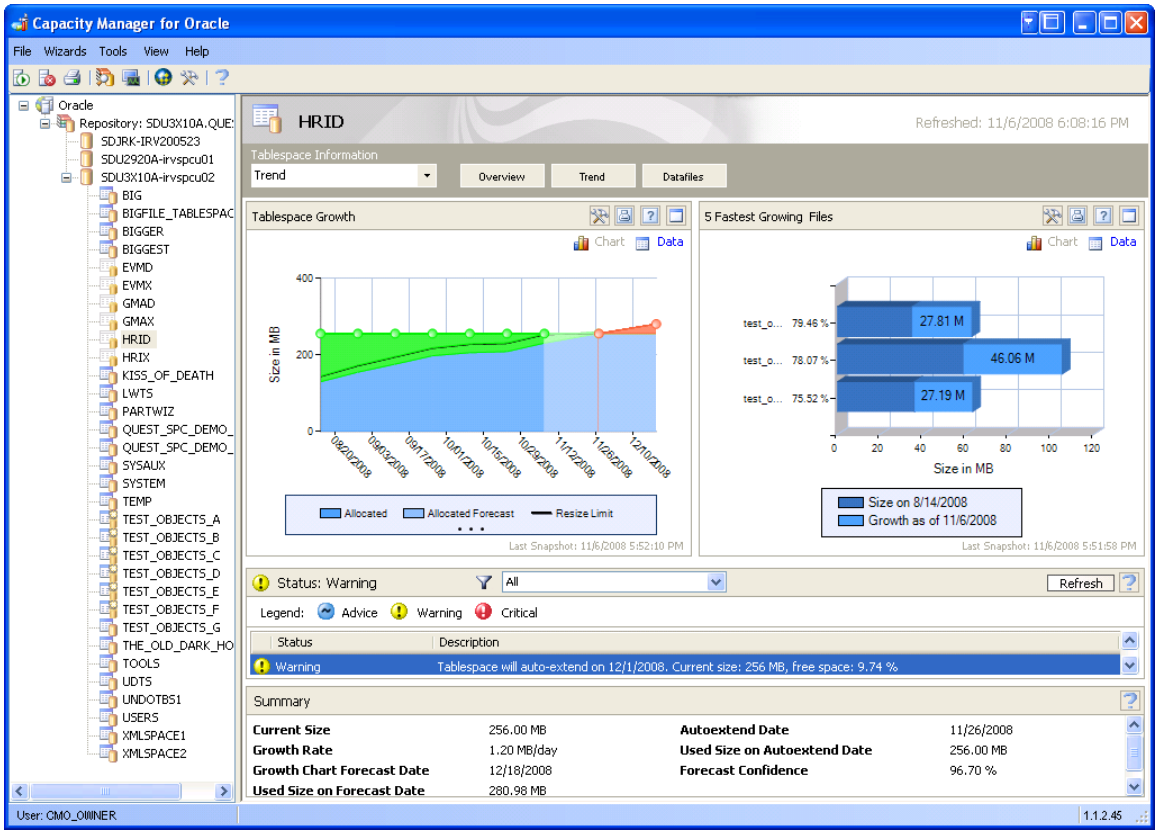

Figure 6: Forecast of database growth in graph form

You can view the same information in data form:

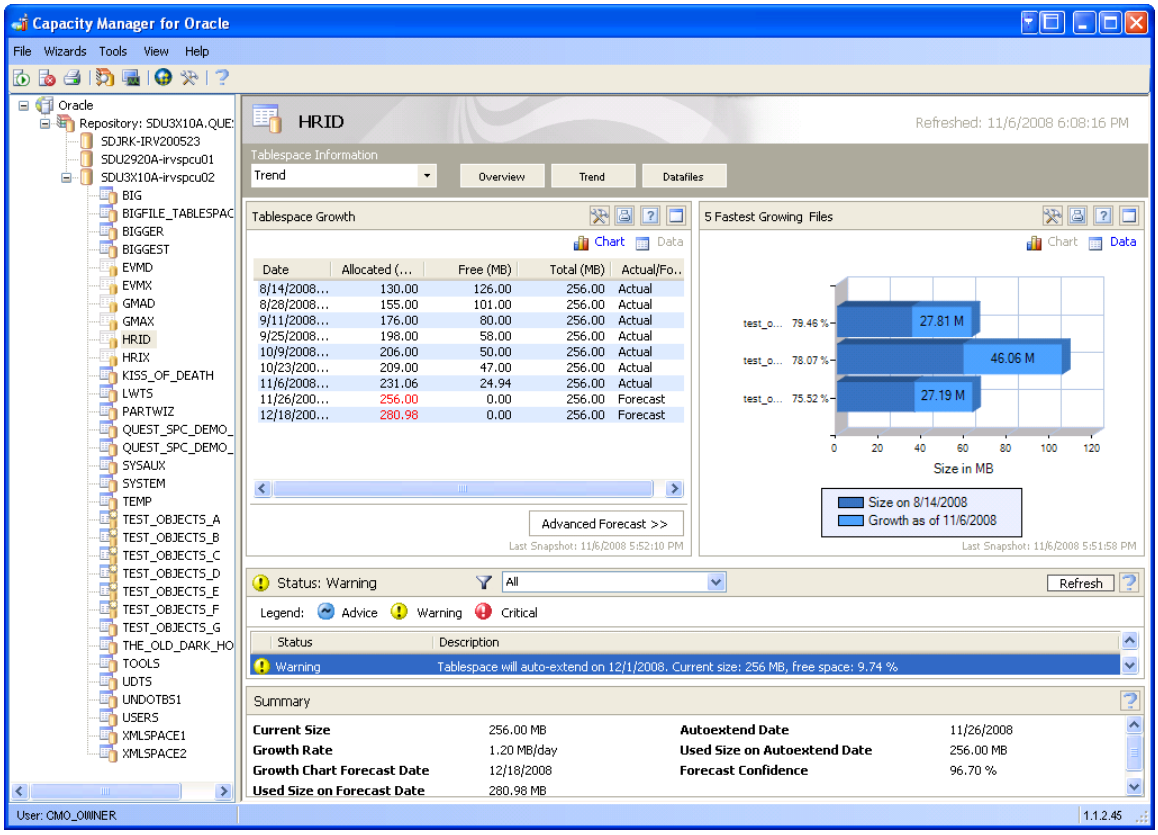

Figure 7: Forecast of database growth in data form

Changing the Forecast Date

You can easily change the length of the forecast by clicking **Advanced Forecast** and choosing a different date.

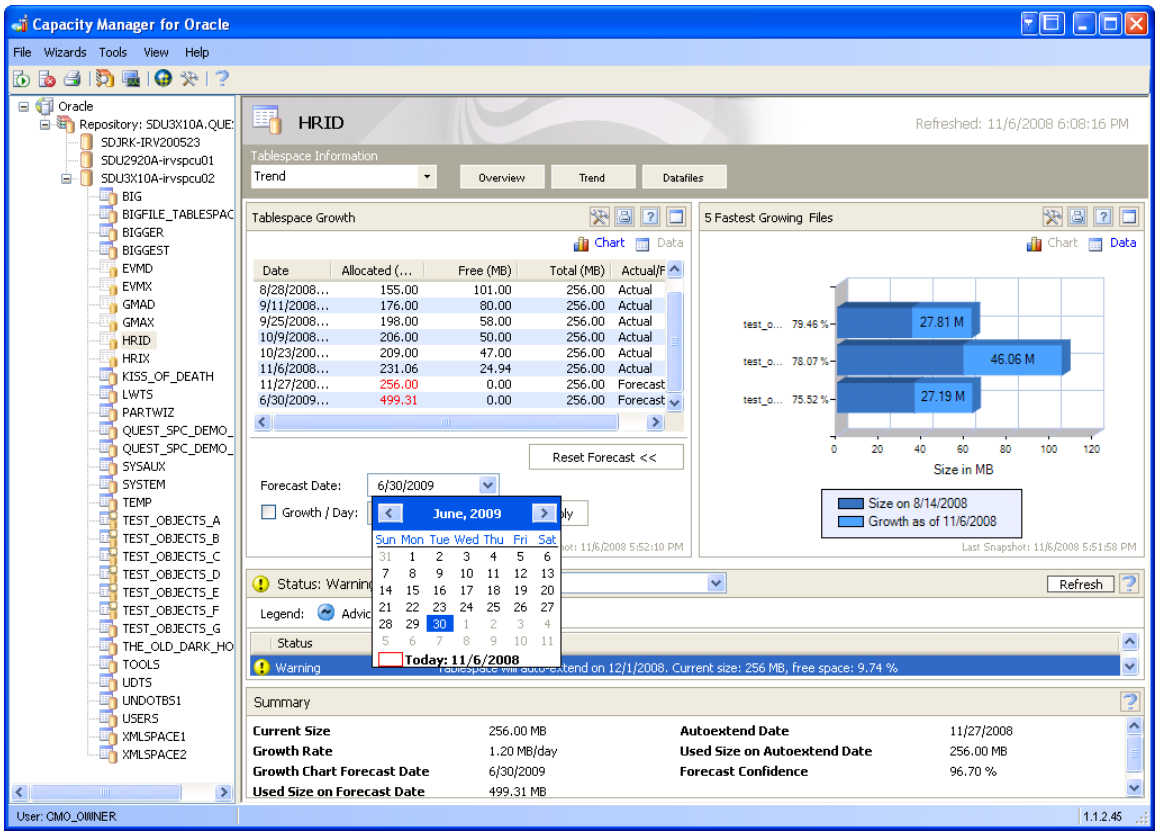

Figure 8: Choosing a different forecast date

Adding in Business Intelligence

If you know that database growth will be faster or slower in the future, you can use that business intelligence to get a more accurate forecast. To perform such "what if" modeling, simply specify a different growth rate in the drop-down provided, as shown in Figure 9.

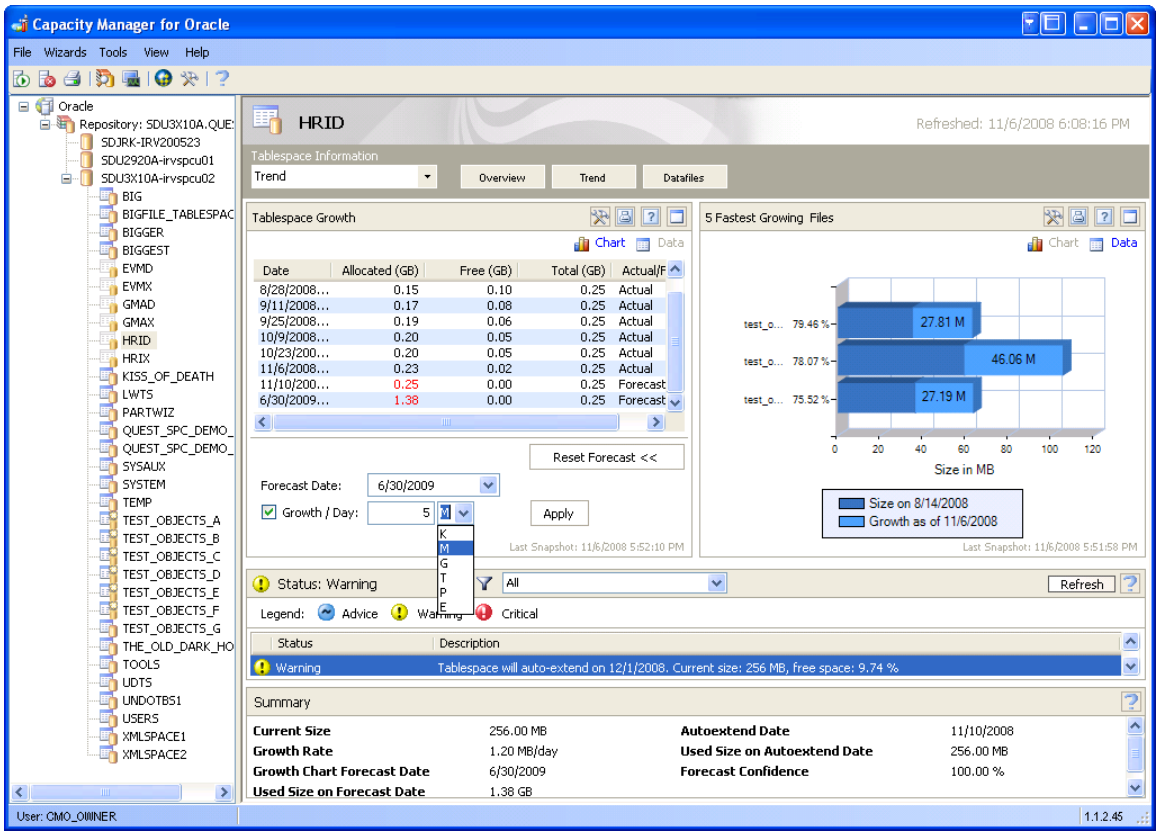

Figure 9: Forecasting database growth over time: "What if" scenario

At the projected growth rate of 5 MB/day, at least 1.38 GB needs to be allocated to this tablespace to accommodate its growth through June 30, 2009.

You can easily view the same growth forecast in graph form:

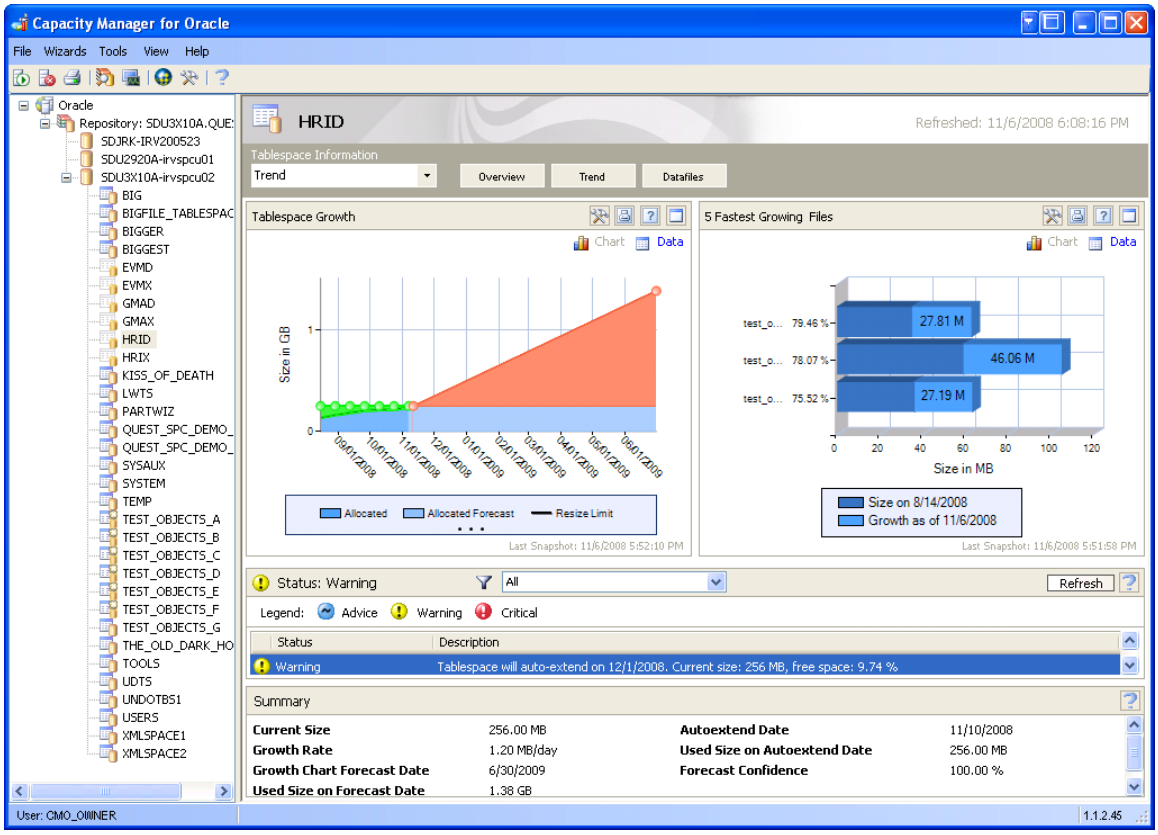

Figure 10: Forecasting database growth over time, graph form

Reporting Your Findings

The final key step in capacity planning is getting the information to the people who need it to make decisions, justify purchase requests, and so on.

Exporting Data to Excel

Capacity Manager makes it easy to use and distribute information. You can export information into Excel right as you view it using the Copy Grid function:

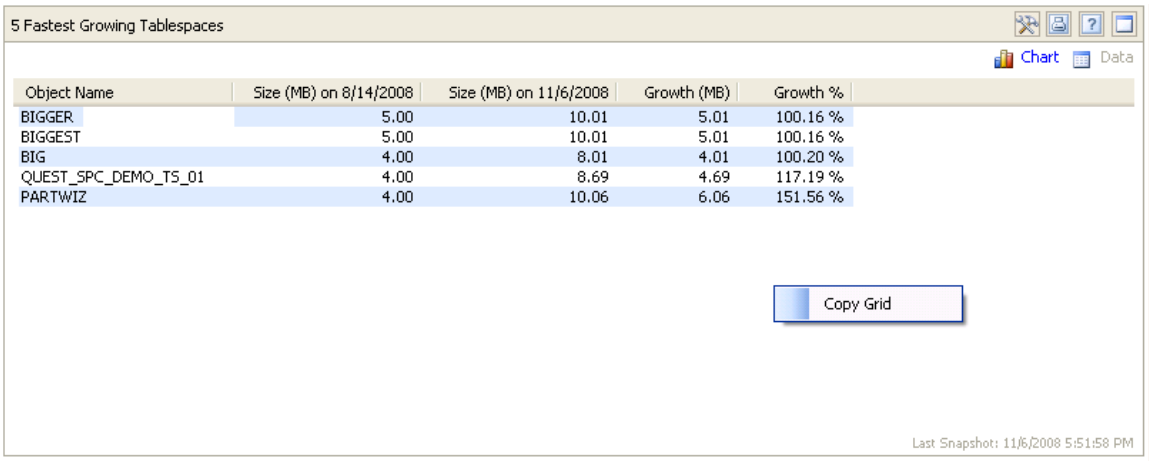

Figure 11: Exporting data to Excel

Creating Reports to Print, Save, or Email

You can also easily create reports with your custom heading, like the Database Trend Report show below, and quickly print, save, or email them.

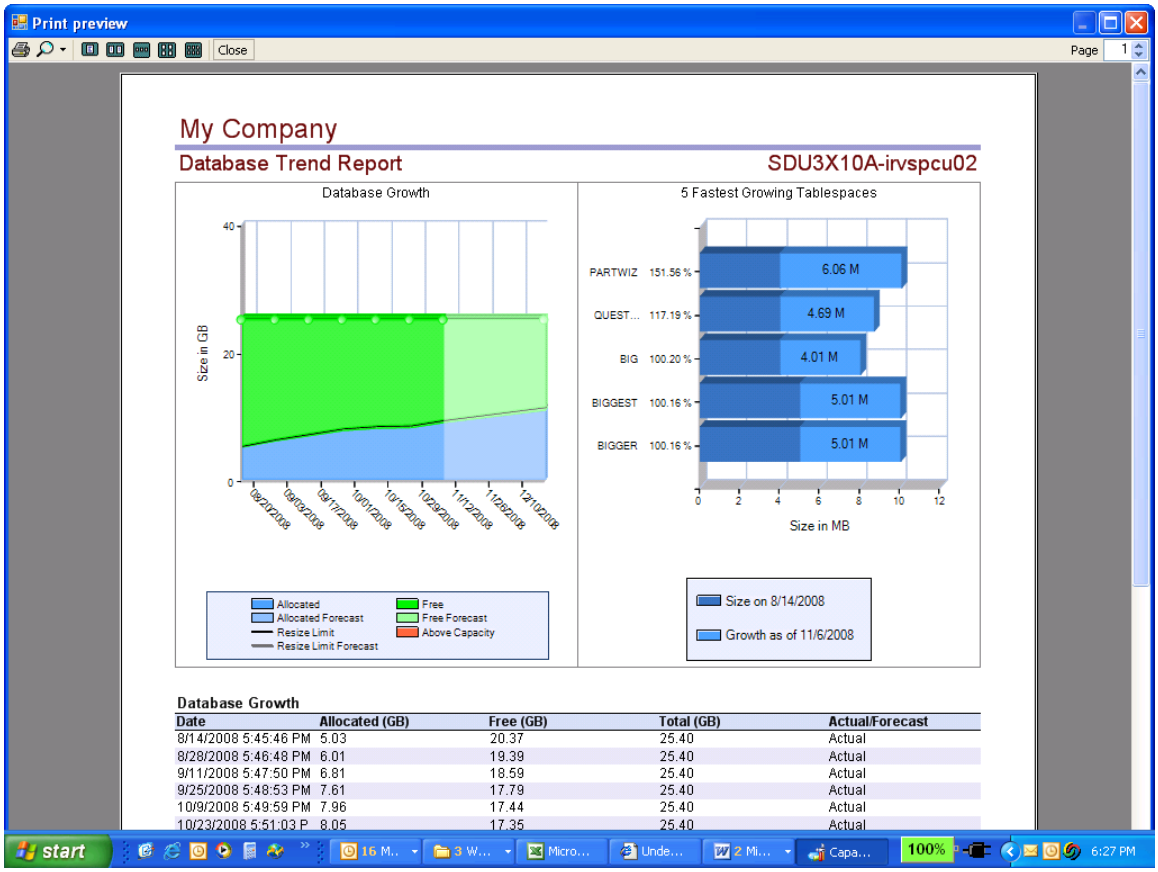

Figure 12: Creating a report to save, print, or email

Summary

Capacity Manager enables you to visualize the current status and predicted growth of groups of databases and their tablespaces. You can quickly see the largest and fastest growing tables and tablespaces in any database, so you can identify and correct emerging issues before they impact your users. And you can supplement Capacity Manager's forecasts with business intelligence, such as expected changes to growth patterns, to accurately forecast your resource needs. Finally, you can easily share Capacity Manager's analysis and forecasts with team members or management, either by exporting data to Excel or by creating reports to print or email.

For More Information

For more information on Space Manager with LiveReorg and Capacity Manager, please visit our product webpage at http://www.quest.com/Space-Manager-with-LiveReorg/.

You can also join the Space Manager Community to participate in discussion forums with other users, get tips and tricks, test beta versions of new releases, and submit questions to the Quest experts. You'll find our community at http://spacemanagementoracle.inside.quest.com/index.jspa.

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- Seek help from a support engineer
- Log and update your case, and check its status

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