

Oracle Calendar

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EXECUTIVE OVERVIEW

Oracle Calendar has the potential to become the connective tissue of your organization, with a unique ability to tie together crucial variables relating to your projects and processes – including time, place, users and resources – becoming far more than a mere personal schedule tracking device, but an integrated platform for improving time management.

Oracle Calendar drives real-time collaboration, managing calendar specific information such as context (time, location, attendees, notes, tasks), availability and priority on any platform, with any device.

While many calendar systems can offer adequate personal information management, true power comes from connecting people and places across distance and time. Driven by the power of the Calendar server, Oracle Calendar steps in where current systems fall short of enterprise requirements, alleviating some of the pervasive problems in enterprise time management systems:

1. Instead of maintaining disparate calendar systems for group calendaring, resource scheduling, web conferencing, personal information management and events, etc., Oracle Calendar is a comprehensive calendaring and scheduling system that allows you to consolidate all your time management activities onto a secure, scalable, reliable platform and extend calendar data for use across different collaborative environments.
2. Legacy collaboration software relies on e-mail as a delivery vehicle for calendar data, causing time lags, and misrepresenting availability of users and resources in the system. Oracle Calendar's real-time functionality and high performance means the information that is represented in user's calendars is always up-to-date, always relevant – overcoming lag-time, and delays in business process execution.
3. Access to information is at the crux of any collaborative solution. Oracle Calendar's multi-channel access means users can choose from a range of platforms and methods to access centrally stored calendar data: the familiar Microsoft Outlook interface, dedicated calendar clients for Mac, Linux and Windows, browser access, integrated with your enterprise portal, or choose from a range of mobile and sync options.
4. Integration with other Collaboration Suite components such as the Collaboration Suite Portal, Workspaces and Web Conferencing enable users to leverage their Calendars or calendar data exposed through other interfaces to seamlessly switch tasks and applications within the context of their business process.
5. Oracle Calendar is built on a standards-based infrastructure, ensuring your enterprise is ready to support new, cutting-edge technologies, and to protect your investment against ever-changing IT challenges.

ORACLE CALENDAR: BUILT FOR TODAY'S ENTERPRISE

Spanning an Organization

By connecting people and applications in an accessible, reliable and cost-effective manner, a calendar system provides a central store for information such as who, what, where, when and why that is always accessible, regardless of time or place, across the entire organization.

Oracle Calendar contains and processes the complex and dynamic matrix of individual, group and resource availability, and delivers it in a coherent manner, making it possible for end-users to easily interpret and use the information. This translates into powerful features such as real-time conflict checking, ensuring that there are no conflicting events scheduled at a particular time, and “suggest time & date”, where the Calendar server can suggest a set of proposed meeting times based on user-defined criteria.

Oracle Calendar brings the power of group calendaring, resource scheduling and workflow into one integrated application, allowing people to combine location-based information and time sensitive data. Using the “group view”, a logical representation of the free/busy matrix, users can see the combined free/busy times for a group of people and/or resources, allowing them to manually select the best time slot for the proposed activity. Users can also quickly find and book a resource based on specific criteria, such as location or resource type. And through integrated approval workflow, resource managers can ensure the appropriate allocation of resources.

With support for UTC and UTF-8 standards, Oracle Calendar can span time zones and cultures, connecting people and places no matter how dispersed they are. Using UTC (Coordinated Universal Time – formerly GMT or Greenwich Mean Time) ensures that all time references are made according to the global base time. Meetings are stored in the Calendar server in the standard UTC time zone and then converted back to the local time zone for display on the client. This permits full time zone support and ensures that there is no ambiguity about the actual time of the event.

UTF-8 (UCS Transformation Format 8) is a standard format for the conversion and re-conversion of supported character sets to and from a base format, thus allowing the data in Oracle Calendar to be shared across the variety of supported platforms and languages. For example, a user in Japan schedules a meeting with two of his colleagues using Oracle Connector for Outlook on his Windows 2000 machine. He invites someone from his office that uses a Macintosh client, as well as someone from Korea who is using a Netscape browser to access the Web client. Each attendee's operating system uses a different character set, but because the server converts and stores the information in UTF-8, they are able to read the meeting details without any problems.

Oracle Calendar's underlying infrastructure offers organizations a truly enterprise-wide solution, rather than a workaround, where smaller, local deployments may be connected and/or synchronized. A key advantage in having a consolidated user community is the ease with which an organization can communicate with all its members. Through event calendars, Oracle facilitates this enterprise-wide communication, providing a means for storing, tracking and displaying contextual information surrounding any number of events. For instance, an organization may choose to setup an event calendar for the social committee and another for network maintenance, and educational institutions may choose to use event calendars to publish course schedules. The event calendar administrator or designate can easily populate the agenda with any information, then set the appropriate access rights, ensuring that only the intended audience is able to access it. Users can then view the event calendar and populate their own calendars with the information they need.

As with other Oracle products, Oracle Calendar offers a solution that adheres to the most recent standards defined in Section 508 of the Americans with Disabilities Act (ADA), a government initiative to provide access to electronic information to people with disabilities. Some of the Section 508 requirements are the ability to set custom color schemes, to interface with text-to-speech translators, to access all functions through the keyboard, and to set up simple menu structures. Together with Hardware, OS and Assistive Technology (AT) product manufacturers, Oracle is part of a technology stack that provides the complete accessibility solution.

Oracle Calendar allows for enterprise-wide group and resource scheduling, with support for multiple platforms and access methods, including the familiar Microsoft Outlook interface, with integrated access to calendar, email, voicemail and faxes.

Access Channels

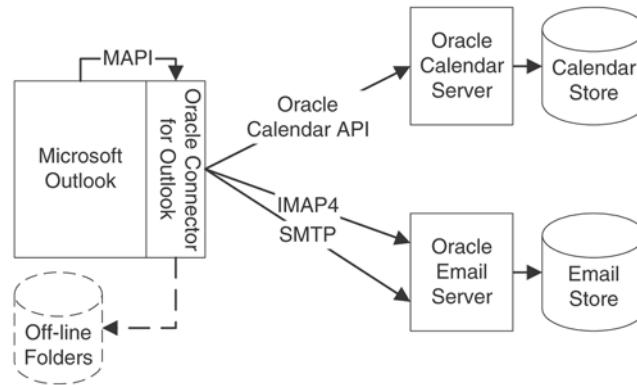
Access to information is the crux of any collaboration solution. Scalability and reliability are meaningless if the information can only be accessed from a few limited points. Oracle Calendar offers a wide variety of access channels, providing users with a choice of the one(s) that best suit their needs and personal work style. From desktop solutions to wireless synchronization, Oracle Calendar ensures that information is delivered in a timely, relevant manner.

Oracle Connector for Outlook

Oracle Connector for Outlook extends Microsoft Outlook to provide a unified client for Collaboration Suite, giving users access to e-mail, voicemail, fax and real-time calendaring. By re-using Microsoft Outlook's familiar UI, enterprises can provide a familiar environment for employees to collaborate while minimizing the costs incurred on end-user training. As a MAPI service provider, Connector for Outlook communicates directly with the Calendar and Email servers, converting e-mail, fax, voicemail and calendar data into MAPI constructs for display in the Outlook interface.

Using IMAP4 and SMTP protocols, the Connector for Outlook communicates with the Oracle Email server(s), which handles incoming/outgoing e-mail messages, voicemail messages and faxes. It also connects with the Calendar server

using the Oracle Calendar API for meetings, events, tasks, contacts, notes and journals. Because it maintains a persistent connection with the server, changes to a users schedule are immediately reflected on the desktop. The user can also synchronize their offline store with the information on both the calendar and e-mail servers in the event that they need access to their information while not on the network.



Since Outlook no longer relies on Microsoft Exchange for calendaring, it is no longer subject to the deficiencies of a message-based solution. Users now have instant access to relevant information, bringing more power to features such as auto-pick, checking availability and attendance status and PDA/mobile device synchronization using supported Outlook synchronization tools.

Oracle Connector for Outlook can coexist freely with a number of other service providers that interact with Outlook through MAPI, such as the Personal Folders, Personal Address Book and virus protection software.

Oracle Calendar Desktop Client

The desktop client provides feature rich calendaring to users running Windows, Macintosh, Linux and Solaris. With full support for cross-platform environments, organizations can choose any combination of server and client platforms to extend support to all employees. Because it maintains the norms and conventions of each operating system (OS), the desktop client is intuitive to use: Mac users will feel at home using the desktop client on Mac OS X while Windows users will find all they need by right-clicking on the application and accessing the context menus. Maintaining OS conventions flattens the learning curve, permitting the user base to get up and running quickly without the need for costly training, thus decreasing the total cost of ownership.

Designed with the power user in mind, Oracle Calendar desktop client offers fast and easy access to the calendar data, no matter whether you are online or offline. The desktop client can be configured to download the agendas of frequently invited

people, resources or groups. Users maintain the ability to resolve scheduling conflicts and locate another user, even when they are not connected to the network.

Oracle Calendar Web Client

The Web client enables performant, feature rich calendaring over the Internet/Intranet, permitting users to have full access to their calendars away from their desks. Developed along side the other clients, the Web client incorporates the latest enhancements in functionality, ensuring that it even fulfills the needs of the power user.

The Web client is also fully integrated with the Oracle Collaboration Suite portal. Much like Outlook, the Collaboration Suite portal gives users an integrated environment for e-mail, calendaring, voicemail and fax. It also encompasses the other components of Collaboration Suite, including Content Services, Real-time Collaboration, Workspaces, and Mobile Collaboration set-up, making it the most complete collaborative tool available to end-users.

Mobile Calendar Access

Oracle Calendar further extends the collaborative environment by leveraging synchronization and mobile collaboration technologies to provide a complete set of access tools, giving mobile users access to the data they need, when they need it.

Calendar Access On-the-Go

Using Oracle Mobile Notifications, Oracle Calendar allows users to set a variety of alerts for meetings, events, and tasks which are then delivered via email, SMS messages, fax or voice based on the user's delivery rules and preferences. Also, using Mobile Text Access, users can send commands to the Oracle Mobile Collaboration Server gateway via email or SMS in order to trigger a content specific notification. For example, by sending the command "cal" to the gateway, a list of the user's appointments for that day is returned to the device.

Users can also browse their Calendar using Oracle Mobile Browser Access, which provides mobile browser access to the calendar data over 2G, 2.5G and 3G networks, supporting virtually any wireless device, including WAP and i-mode compliant devices. Users can view, create, modify and delete data in their Calendar all from the mobile internet browser on their device.

Finally, via Oracle Mobile Voice Access, users can connect to the Calendar server using voice channels such as a telephone or mobile phone. Using Oracle Mobile Collaboration Server and a VoiceXML-compliant gateway, voice commands are interpreted and passed along to the Calendar server. The necessary actions are performed and the appropriate information is sent back to the user in a logical voice pattern. Since Oracle supports standards, organizations are not locked into a particular voice solution and are free to choose whichever VoiceXML-compliant gateway they prefer.

Synchronization

Committed to a standards-based approach to synchronization, Oracle Mobile Data Sync uses the Open Mobile Alliance – Data Synchronization standard (OMA-DS, formerly SyncML) to provide over the internet synchronization of calendar, contact and task data.

Oracle Mobile Data Sync provides the server piece of a standards-based synchronization infrastructure that allows users to synchronize their Collaboration Suite calendar and contact information with the Personal Information Manager (PIM) on their mobile device. Devices such as PDAs or RIM BlackBerrys that do not support OMA-DS out of the box can still benefit from the power of Oracle Mobile Data Sync using 3rd party OMA-DS applications such as the Synthesis SyncML Client. And with Oracle Device Management, the OMA-DS client can be installed (if necessary) and configured Over the Air (OTA), allowing the user to be transparently setup to use the service.

And, as Oracle Mobile Data Sync is not tied to a particular internet connection model, users can use any of their devices' supported internet connection methods such as GPRS, desktop/cradle, infrared or Bluetooth®. For instance, a user may use a GPRS connection while on the road but use a desktop/cradle connection while in the office to save on wireless data consumption and get a faster sync. Whether through a physical connection to the network or using wireless Internet technologies, users get the same sync experience delivered through the same UI on the device, reaching a new level of flexibility.

For users requiring a more traditional approach to synchronization, Oracle Calendar is certified against a set of 3rd party Microsoft Outlook synchronization options. Oracle also offers native synchronization capabilities through Oracle Calendar Sync, which supports Palm OS and Pocket PC devices. By replacing the desktop application with a conduit directly linked to the calendar store, users can synchronize events, contacts and tasks between their PDA and the Oracle Calendar server. This provides employees with access to information such as meeting attendees/resources and attendee status – extending the PDA beyond Personal Information Management (PIM).

RIM BlackBerry

Previous versions of Collaboration Suite already supported BlackBerry devices by using the Consilient2 Management Server (CMS) as a broker between BlackBerry Enterprise Server (BES) and the Collaboration Suite Email and Calendar servers. This solution is being extended to support the new Consilient4 product.

New for Collaboration Suite 10.1.1, Oracle Collaboration Suite provides direct access from RIM BlackBerry devices, removing the need for a BES infrastructure. Using the Consilient Client, users can benefit from Oracle Mobile Data Sync to synchronize their BlackBerry's calendar, and Oracle Mobile Push Mail to automatically send and receive emails in real-time. Based on the emerging P-IMAP standard, Oracle Mobile Push Mail delivers real-time email to mobile devices that

are fitted with a small P-IMAP client. Much like the OMA-DS client, the P-IMAP client can be downloaded, installed and configured OTA via Oracle Device Management. Organizations can finally deploy a complete standards-based solution for their BlackBerry which can even be extended to support other devices such as Pocket PCs and Nokia Symbian phones.

For more information on Oracle Mobile Collaboration, Oracle Mobile Data Synchronization or Collaboration Suite support for RIM BlackBerry devices, please consult the Oracle Mobile Collaboration Server Technical White Paper.

Access Controls

Because Oracle Calendar has the power to bring everyone in an organization together, it has built-in measures to ensure that privacy and confidentiality are not compromised. Users have the ability to set specific access rights for their calendars, which are stored on the server and applicable to all access channels. In this way, access to personal information can be restricted, right down to the individual meeting. It is even possible for an individual to determine whether another individual or group of individuals has the right to invite them to an event.

Events and tasks are divided into 4 categories, public, normal, confidential and private. Public events are viewable by everyone on the system, while other events are completely configurable. Users can determine whether individuals or groups can view the meeting details and attachments, the meeting times, or nothing at all.

Users can also setup designate rights. These rights bestow proxy abilities upon other users. For instance, an executive may give designate rights to their assistant, permitting them to book meetings on their behalf. Designate rights can be given to book events and tasks, as well as reply to events on behalf of another person. Like other access rights, designates rights are general enough to apply to an entire agenda, yet specific enough to be applied to individual meetings.

Oracle Calendar is time management built for a suite – centrally storing all time-based data for streamlined access and across integrated Oracle Collaboration Suite features like Web Conferencing, Mobile Access and Oracle Internet Directory.

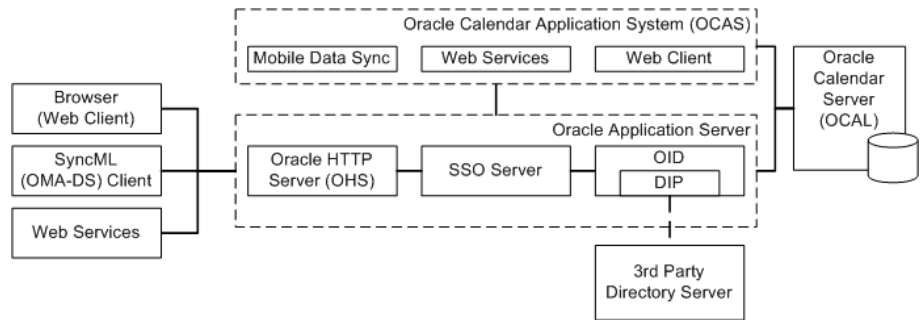
Integration with Oracle Application Server

The Oracle Calendar Application System (OCAS) is delivered by Oracle HTTP server (OHS), a component of Oracle Application Server 10g Release 2 (OracleAS 10gR2). OCAS comprises the Web client, Mobile Data Sync and Web Services, which make use of fastCGI technology to establish a set of persistent connections to the Calendar server. Whenever there is a call to an OCAS component, OHS requests the calendar data through one of the open connections. The number of persistent connections is entirely configurable, allowing organizations to adjust the setting based on their usage statistics. This technology reduces the server load and permits the quickest access to the Calendar server (OCAL).

Oracle Identity Management

Through its use of OracleAS 10gR2, Oracle Calendar benefits from Oracle Identity Management, an integrated, scalable and robust identity management infrastructure.

A central component of Oracle Application Server Security, Oracle Identity Management includes Oracle Internet Directory and Oracle Single Sign-On.



Oracle Internet Directory

Oracle Internet Directory (OID) takes full advantage of the scalability, performance, security and high availability of the Oracle 10g infrastructure. It acts as the central user repository for Collaboration Suite components as well as other Oracle applications. These components frequently store data such as user preferences and configurations and policies directly in OID, making them accessible to other applications. This limits the replication of user data across Collaboration Suite and other Oracle applications. And, through OID Self Service Console, a web-based administration tool, organizations have a central point for adding users and provisioning Oracle Collaboration Suite services, such as Oracle Calendar.

OID is a central point for directory integration and synchronization, supporting all the flexibility and compatibility of the LDAP v3 directory standard. With Oracle's Directory Integration Platform (DIP), organizations can keep their current directory infrastructure, maintaining bi-directional synchronization between the master information repository and OID. Essentially, Oracle Internet Directory behaves as a cache for the directory server information – all administration can be carried out on the master LDAP repository. However, unlike in a traditional directory cache, any changes to directory information made through Oracle applications are made in OID and propagated back to the master directory by DIP.

Whether an organization decides to consolidate their directory information in OID, or maintain their existing directory infrastructure, Oracle Calendar account information will always be current, without the need for manual synchronization.

In order to improve performance, the Oracle Calendar server caches much of the information stored in OID such as the Global Address List (GAL) and user information, limiting the number of calls between the servers. OID and the Calendar server are synchronized regularly and the Calendar server will push any updates to OID (such as modifications to preferences or the common address book).

Single Sign-On

The OracleAS 10gR2 Identity Management infrastructure also allows the Oracle Calendar Web client to benefit from Single Sign-On as an authentication method. Once a user is authenticated via the Single Sign-On server (OracleAS 10gR2 SSO), their session information is carried through all other applications in the portal. Requests are no longer routed to OracleAS 10gR2 SSO, but are passed directly to the appropriate applications.

The first time a user requests access to Oracle Calendar via the Collaboration Suite, the request is routed by the Oracle HTTP server (OHS) to OracleAS 10gR2 SSO, which verifies whether a valid SSO cookie is set. If the SSO cookie is not present, OracleAS 10gR2 SSO requests a username and password, validates the user's credentials against OID, and sets an encrypted, non-persistent cookie in the browser.

Once a valid SSO cookie is set, OracleAS 10gR2 SSO sends an encrypted token back to the Calendar application, confirming that the user is authenticated. The Calendar application also sets a cookie on the browser, confirming the user's right to access the application. Subsequent requests are routed directly to the Calendar application. For more information on SSO, see the security section under deployment considerations.

REAL-TIME AVAILABILITY

Calendar data is only useful if it is up-to-date. Stale information provides little use to someone who needs to know what is happening at a specific moment in time. Originally designed for small offices, message-based solutions rely on e-mail as a delivery vehicle for calendar data. E-mail messages are used to carry event invitations and details, as well as attendance status. This information only becomes viewable to others once it has been processed through an attendee's e-mail inbox. These systems fail the moment a user is cutoff from e-mail for an extended period of time.

Some message-based systems have tried to overcome this deficiency by invoking server-side rules for processing data in a user's inbox. However, this leads to even more inaccuracies since the data is processed using a set of inflexible criteria. Although a meeting may be accepted/declined and published by these rules, it may not be an accurate reflection of the user's real intent. They may have accepted a meeting that the rules dictate the system to reject, or the user may want to tentatively accept the meeting, or leave it as unconfirmed in case something urgent pops-up. This is further complicated by the fact that many systems do not show refused meeting invitations in the calendar view. Oracle Calendar allows users to choose to show refused meetings, giving them a precise overview of the day, week or month.

A good analogy would be the difference between newspapers, which are updated at the time of print (message-based), and live news broadcasts, which can be up-to-the-second (real-time). Since employees work together in an evolving environment,

With Oracle Calendar, information is represented in user's calendars in real-time – always up-to-date, always relevant – preventing miscommunication and double-bookings and keeping everyone on the same page.

they need to rely on the real-time technology of Oracle Calendar to bring them accurate, timely information.

Unless a user is actually monitoring their e-mail constantly, message-based systems will never be able to give an accurate representation of their availability, leading to both over-booked time, where a user is double or triple booked, and an incorrect representation of free time, where a user's time has been blocked off for meetings they never intend to attend.

Oracle Calendar's real-time technology allows Calendar "clients" to connect with the Calendar "server" via persistent connections, providing instantaneous access to the database. When a user creates/modifies a meeting or event, a single record is instantly created/updated in the calendar database and shared by anyone needing to access it, giving them an up-to-the-second view of free/busy time. This translates into quick searches and up-to-date information, including unconfirmed and newly scheduled events, while minimizing the need for network and resource intensive data replication.

Moreover, Oracle Calendar drives real-time alerts and notifications through Collaboration Suite, removing the dependence on random schedule checking by the end user. Through Oracle Mail and Mobile Collaboration, Oracle Calendar delivers relevant information to those who need it, when they need it.

INTEGRATION WITHIN COLLABORATION SUITE

Deployed as part of Collaboration Suite, Oracle Calendar shares a common infrastructure with messaging, content management and real-time collaboration services, providing an integrated suite of applications to meet the collaborative needs of today's workforce. This also provides a framework for leveraging data across applications, such as using distribution lists to schedule group events or searching for content within mail, files and calendar entries.

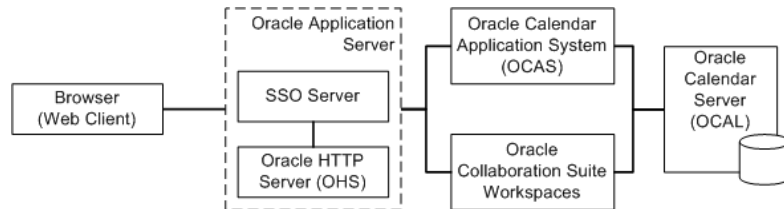
Oracle Collaboration Suite Workspaces

Nowhere is this level of integration more apparent than in Oracle Collaboration Suite Workspaces, new for Collaboration Suite 10.1.1. Workspaces delivers contextual collaboration capabilities by providing easy organization and management of meetings, people, tasks, documents and discussions, all within the scope of a particular project or team. Users benefit from shared organization; team calendaring, scheduling and task capabilities; access to team information through personal productivity tools; simple navigation between content; and contextual organization and search capabilities.

By leveraging the Java OCAP Calendar SDK and extensions to the Calendar server, Workspaces is able to provide a single calendar for all events within the context of the project or team, providing support for free/busy lookups, repeating meetings and Web Conference enabled meetings (see the Oracle Real-time Collaboration section for more details). Through the Workspaces application, users have the

option of a personal calendar view (events they're invited to) or a public calendar view (all workspace events). Further, since Oracle Calendar powers the Workspaces calendar functionality, users can access all events they are invited to through all other Oracle Calendar access channels. In other words, rather than having to maintain separate agendas, meetings created in Workspaces appear as regular meetings in users' agendas, and as such, these meetings can leverage Oracle Calendar functionality such as reminders, synchronization and offline access.

Collaboration Suite Workspaces provides a mechanism to organize, manage and



learn from collaboration that occurs within the context of events, projects and teams. Documents from the library can be used as meeting materials, action items can be managed, controlled pre- and post-meeting discussions can occur, follow-up meetings can be scheduled and more. And, with cross-workspace searching capabilities, organizations ensure that their employees can reuse the intellectual capital generated by enabling them to quickly find the appropriate content.

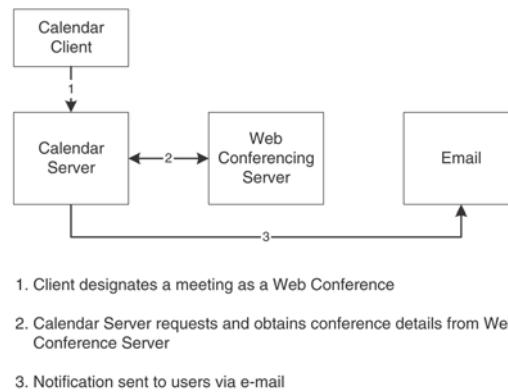
Common Address Book

Also new for Collaboration Suite 10.1.1, Oracle Calendar leverages a Common Address Book, providing a single repository for contact information that can be leveraged by all components within the suite. Stored in Oracle Internet Directory (OID), the Common Address Book can be accessed using the Oracle Web Access Client, Oracle Mail web client, Oracle Calendar desktop client or Oracle Connector for Outlook. Users now use the same set of contacts, eliminating the need for keeping multiple copies in multiple locations. Users can also access their address book while on the go using Oracle's synchronization and/or wireless & voice technologies. Further, Oracle Calendar extends the common address book by allowing users to share their contacts with others, avoiding the spread of redundant contact information throughout the network.

Oracle Web Conferencing

Oracle Web Conferencing, a component of Oracle Real-time Collaboration, is an online conferencing tool that provides employees, customers, and partners with a common, flexible, Web-based environment for meetings and presentations. Oracle Calendar lets users schedule and join Web Conferences directly from within the calendar application.

Once a user classifies an event as a Web Conference, the Calendar server communicates with the Web Conference server and obtains the URL for that event. This Web address is then embedded in the meeting so that attendees can view the meeting details and access the Web Conference directly from their calendars. Rather than relying on information contained in an email trail, this schema provides a common repository for information such as the meeting URL, dial-in information and agenda, as well as any pre-meeting documents that need to be reviewed.



Furthermore, with the ability to record and archive Web Conferences, users can use their calendar to go back and access previous Web Conferences they may have missed or wish to review, giving them a much more logical way in which to browse scheduled events.

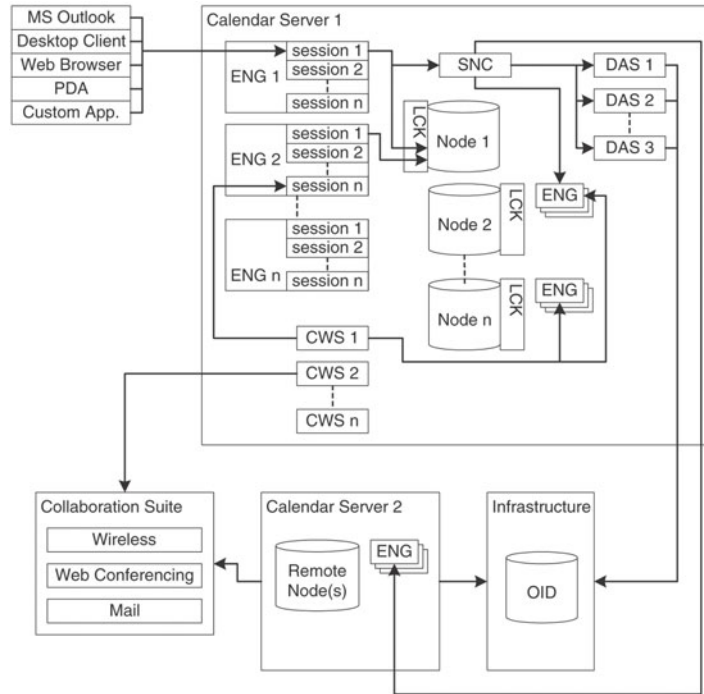
HIGH-PERFORMANCE CALENDAR SERVER

Oracle Calendar's superior architecture permits the server to be less resource intensive and handle more users than any other calendaring system. Since the database is optimized for calendaring and not another application, calendar data can be indexed to provide high performance queries on time sensitive criteria, such as date ranges. Also, by using pointers rather than replicating data, table sizes are kept to a minimum. This reduces the load on the server and increases system efficiency, making Oracle Calendar a fast and scalable solution.

Already hampered by delays and inaccuracies due to unprocessed or rules-driven processing of a user's e-mail inbox, message-based systems are further delayed by the lag time involved with data replication across all the servers in a system. With Oracle Calendar, organizations can consolidate many remote servers into one central environment. This architecture helps people work together more efficiently, increasing their productivity while virtually eliminating double booking.

Using a set of finely tuned processes (services), the Calendar server manages all access to the data store, optimizing performance, scalability and hardware usage. The multi-threaded **Calendar Engines** (ENG) service all requests for access to the

database (Node). They can be configured to handle a large number of requests; either by spawning new threads (sessions) within the same ENG process, or by spawning new ENG processes altogether (to handle large increases in demand). The **Lock Manager** (LCK) ensures orderly access to the data by queuing and processing each request on a first in, first out basis.



This schema has great advantages over message-based systems in that the ENGs are pulling data from the actual data store, and not a published, out of date representation of it. And the multi-session architecture ensures rapid access to the data, regardless of the volume of incoming requests.

The **Directory Access Server** (DAS) services any request for information stored in OID, such as account information and preferences. Multiple instances of the DAS can be configured depending on an organization's requirements. The **Synchronous Network Connection** (SNC) brokers the incoming requests from the ENG, handing them off to an available DAS. In the event that there is more than one Node or more than one Calendar server configured in a network, the SNC will broker connections between the ENGs for the various Nodes. At startup, the SNC opens and maintains a configured number of TCP/IP connections for each Node, which it uses to handle the requests between them, such as reading a user's agenda that is on another Node.

The **Corporate-Wide Services** (CWS) allow the exchange of information between Nodes, ensuring that events involving users on multiple Nodes are kept locally on each Node, guaranteeing rapid access to each person's information. Other functions such as e-mail notifications, wireless alerts, Web Conferencing

integration, server-side reminders and synchronization with OID are also handled by CWS, which can be shared between one or more instances of itself.

Standards-Based Data Model

By defining and implementing standards for the format, transport and storage of data rather than pushing proprietary technologies, Oracle sets the stage for the unification and exchange of enterprise data. The use and support of object-oriented calendar events such as iCalendar (iCal), vCalendar (vCal) and vCard empowers developers to build tools that facilitate data interchange between various, disparate application areas, ultimately bridging the virtual islands of information that exist within most organizations.

As information systems become more and more integrated with business processes, the need to extract and use the information gathered becomes more and more vital. Without a proper strategy for managing information, organizations will be at a competitive disadvantage vis-à-vis companies possessing a strategy for sharing information with employees, customers, suppliers and partners. Standard data formats are the glue that will hold together any “knowledge worker” strategy and ensure the smooth transition of information across applications, departments and organizations.

A key differentiator between message-based systems and Oracle Calendar is the way the calendar data is stored. Because of the optimized database, calendaring functions are more efficient and less taxing on the system. While message-based solutions try to compromise existing message structures, adapting pre-defined fields such as the “subject”, “body”, and “to” fields, Oracle Calendar data is stored using a format optimized for calendaring, representative of iCal objects.

Based on vCalendar, iCalendar objects contain both the calendar details and the format by which they are defined, enabling the exchange of calendar data between applications or systems. Encoded using Multipurpose Internet Mail Extensions (MIME), iCal objects can be exchanged using a variety of transports, including SMTP and HTTP.

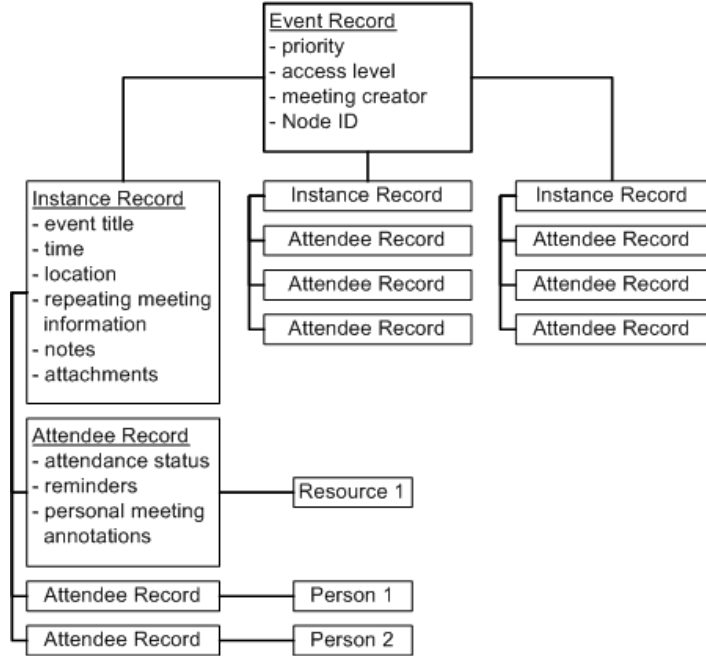
The creation of an event generates three record types, the “event” record, the “instance” record, and the “attendee” record. The event record contains information about the event, such as priority and access level. It also identifies the meeting creator and the Node that the event was created on.

Each occurrence of the meeting will have its own instance record. The instance record keeps track of information such as the event title, time, location, notes and attachments. In order to support the widest variety of access channels, Oracle Calendar supports two methods for defining recurring meetings, simply applying recurrence rules to a single instance of an event, or generating multiple instances of an event based on a set of recurrence rules.

Finally, an attendance record is generated for each entity, such as a user or a resource, invited to an instance of an event. The attendance record is used to track

information such as the item's attendance status, reminder settings and personal meeting annotations or notes.

A standards-based infrastructure allows Oracle Calendar to be extended to fit your enterprise environment with a sophisticated Software Development Kit (SDK) and Web Services toolkit.



Now that the data is stored in a calendar specific format, it can be easily manipulated, queried and exported, providing real-time calendaring to both end-users and other applications.

Extensibility

Organizations that wish to extend the power of Oracle Calendar to other business systems can take advantage of Oracle Calendar's developer tools, which include a Software Development Kit (SDK) and a Web Services toolkit. Developers can extend the power of Oracle Calendar and offer even tighter integration between business processes, ensuring that an organization can leverage its existing infrastructure to get the most return from the investment made in corporate data.

Oracle Calendar SDK

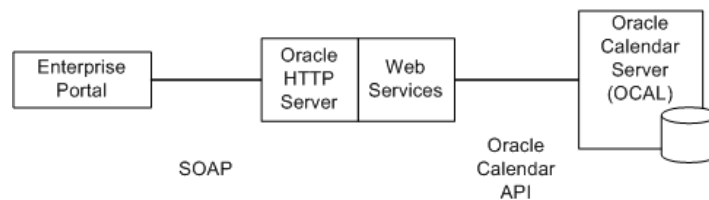
Oracle Calendar SDK (CSDK) is a C-based API that can be used to build custom applications, allowing them to have direct access to the Calendar server. The CSDK supports standards-compliant data representations for events, tasks and contacts (iCal, vCard and vToDo).

Written in C/C++, with a Java Native Interface (JNI) layer, the CSDK can be incorporated into applications developed using C/C++, Java, Visual Basic, or any language that supports native C functions. Further enhancing the value of CSDK is its support for multiple platforms, including Windows, Solaris, Linux, HP-UX and Mac OS.

CSDK's uses are endless, limited only by an organizations needs and creativity. From simple client side reminder programs to server side import and export utilities, CSDK provides developers with the key to the wealth of information contained in the Oracle Calendar store.

Oracle Calendar Web Services Toolkit

Oracle Calendar Web Services (OCWS) are a collection of existing and emerging technologies that provide a means of integrating calendar data into application environments using Web-based technology. With a combination of Extensible Markup Language (XML), Simple Object Access Protocol (SOAP), and Hyper Text Markup Language (HTTP), OCWS can be used to integrate calendaring functionality directly into corporate portals or to build applications that can source data directly from remote applications using HTTP connections.



In order for remote systems to communicate, OCWS uses xCal objects, which are transmitted over an HTTP connection. By formatting iCal information in XML, the xCal object contains both the information and the definition of what the information represents, allowing the receiving system to identify the object. Using simple queries, the web services toolkit allows organizations to easily incorporate data from the Calendar server into their web environment. The systems hosting these web applications in essence become stations for the retrieval and posting of calendar data

Developers can easily source calendar data without having to worry about the details of building SOAP objects. This level of abstraction is provided through the Calendarlet, a set of client-side Java classes that hide the details of the XML data structure.

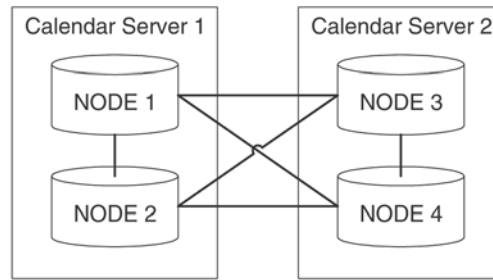
Using this standards-based technology, Oracle Calendar maintains an open-ended infrastructure that enables enterprises to communicate across platforms and empowers employees with an integrated collaborative environment.

DEPLOYMENT CONSIDERATIONS

Calendar server

While Oracle Calendar is the most scalable calendar application, there are various reasons why an organization may want to separate and network several repositories (Nodes) together, such as separating employees based on department or time zone. Multiple Nodes can exist for a single instance of the server, in other words on one

single machine, or can be spread across several instances. These Nodes are linked together to form a Node network.



To ensure fast response times during directory lookups, such as inviting an attendee or booking a resource, essential user and resource information is copied locally to each Node. Users' agendas, however, are kept local to the Node their account is created on. In order to minimize data replication, only events requiring the presence of users on separate Nodes are replicated to the other data repositories. While this model both increases performance and reduces the strain on network bandwidth, it also ensures that information is retrieved directly from the source Node, eliminating false information due to data replication lag times.

When an event is created involving users on separate Nodes, the event information is copied to the remote Nodes, including all details and attachments, giving the invited user(s) quick access to the event data. Only one copy of the event exists on each Node, with each user/resource account pointing to it for reference. This limits the size of the data tables while maintaining the performance levels necessary to guarantee real-time collaboration.

The advanced Node network allows multiple Nodes to act together as one centralized calendar store, no matter how large or distributed the deployment may be. By organizing and distributing user/resource accounts appropriately, administrators can minimize the amount of data transfer, reduce the number of event records and increase the performance of Oracle Calendar, all while maintaining the benefits of real-time calendaring.

Security

Security breaches can severely harm an organization. Not only is there a cost associated with the value of a company's proprietary information, but there is also a cost associated with the resulting downtime. When a system's security is compromised, it can take an exorbitant amount of effort to track down and correct the problem, leading to increased operations costs. Since operations costs represent the largest portion of the total cost of ownership (TCO) of any system, security breaches can have adverse effect on TCO.

As part of Collaboration Suite, Oracle Calendar is developed on an solid foundation. Beyond system availability and reliability, Oracle Calendar ensures that

confidential information is protected from malicious attacks. Using a number of security levels, organizations can ensure that their sensitive data is closely guarded against unsanctioned viewers.

Furthermore, to ensure that users are who they say they are, all clients require authentication to communicate with the server. The authentication method may vary from a simple username and password to integrated authorization schemas such as Single Sign-On (SSO) and Kerberos.

Integration with OracleAS 10gR2 allows Oracle Calendar to benefit from SSO's tried and proven security. Supporting a variety of authentication technologies including Kerberos and SSL, OracleAS 10gR2 SSO can be configured to fit the security needs of every organization. This extensible platform can also service 3rd party applications, giving an organization's employees one single point of authentication for all corporate web applications, and the semblance of a single, unified Enterprise Information Portal.

Oracle Calendar's integration with Kerberos allows for the use of the Kerberos server as a method of authentication to the Calendar server. Kerberos tickets are obtained by the client and sent to the Calendar server for authentication. The Calendar server authenticates against the Kerberos server then, based on the results, grants or denies access to the client.

Oracle Calendar also relies on its extensible Authentication, Compression and Encryption (ACE) framework to secure server-to-server and server-to-client communication. Authentication is used to initiate secure communication, compression is used to compact the data in order to reduce the amount of network bandwidth required, and encryption is used to encode the data for added security. This framework can be customized to fit any organizations needs, balancing security and network performance, and ensuring that all calendar access is protected by the safeguards incorporated in the Calendar server.

In order to prevent Denial of Service (DoS) attacks, Oracle Calendar uses an intelligent blacklist/white list schema. The server administrator can set the maximum number of connections that any IP address can open with the Calendar server. In the event that a hacker attempts hijack a server by opening a large number of connections from a specific IP address, that IP address is automatically blacklisted once the maximum connection threshold is attained. The administrator can then add certain IP addresses to a white list so that they can bypass this security measure. For instance, an administrator sets the threshold to 20 open connections; however, because of the high volume on the Calendar Application Server (OCAS), the OCAS IP address is added to the white list so that it can continue to function given the new security restriction.

It is also possible to block hackers from attempting to gain illegal access by trying to crack user accounts. The administrator can set a maximum number of failed login attempts, after which, the account will be locked for a configured amount of

time. This ensures that hackers cannot use scripts to try username and password combinations until they eventually gain access.

Finally, because the calendar system is separate from e-mail, the Calendar server is not subject to attacks on the Email Server which can bring it to a crashing halt. Since message-based systems rely on e-mail as the transport method for calendar data, organizations using Microsoft Exchange or Lotus Domino would lose access to their calendar system each time their mail server crashed. Oracle Calendar is not at risk to such attacks as the Calendar server manages calendar data exclusively.

Administration

Operations costs, including system administration, help desk staff and end-user training, typically account for the largest portion of the total cost of ownership (TCO). Since a large part of the cost of operations is server administration, reducing the cost involved with administering the server can greatly reduce TCO.

Oracle Enterprise Manager 10g Grid Control (OEM) provides a single interface for monitoring all Oracle applications. From OEM, it is possible to monitor vital information such as the number of logged on sessions, the CWS queue size, the response time to perform a basic Calendar operation, CPU and memory usage and server uptime. Administrators can then evaluate these values against benchmarks for their Calendar environment and determine whether the server is in trouble and whether any actions are necessary.

Organizations can create multiple administrator accounts for Oracle Calendar, each with varying levels of administration rights. In this way, administration of the server can be delegated to more than just one person. Linked to directly from OEM, Oracle Calendar Administrator, Oracle Calendar's Web administration tool, provides a fast and secure way for a centralized administration team to administer the entire network of Calendar servers. Using the OracleAS 10gR2 infrastructure, Calendar Administrator runs either CGI or fastCGI scripts through Oracle HTTP Server, connecting server administrators to the Calendar server, without requiring them to directly login to the machine.

Administrators also have the freedom to setup silent or automatic logins, allowing the Calendar Administrator to be integrated with an organizations Web administration portal. This provides administrators with a simple way to perform routine tasks such as managing accounts, groups and holidays, transferring events from one user to another, backing-up a user's account and modifying the server attributes.

More functionality can be achieved through the command line tools. Useful for troubleshooting, administrators can use the command line interface to invoke various logs, capturing detailed error messages that are useful in debugging issues with the system. They can also provide useful statistics such as the server activity or most popular clients used (Windows desktop client, Connector for Outlook, etc.).

Aside from shipping with over 50 command line utilities, Oracle Calendar also allows administrators to develop their own custom scripts. These scripts may be scheduled or run manually to perform useful tasks such as pre-populating an agenda when an account is created. The built-in utilities allow administrators to perform complex tasks such as backing up a Node or archiving information. Substantial documentation is available for the command line utilities, describing both how to use them and the detailing the results.

Data Loss Prevention

Oracle Calendar provides administrators with a complete array of tools to help them backup, archive and restore calendar data. The tools are flexible enough to meet various organizational requirements and fit with managed document retention programs.

The backup utilities can be run against live servers, and can be configured to backup an individual node, or the entire system. While the backup utilities copy a node, they lock the database, preventing all write commands such as the creation of an event. Users can still browse their calendars in read-only mode. Any write actions are queued until the backup procedure is complete, ensuring no loss of data or productivity.

Oracle Calendar can also be setup in a mirrored environment, ensuring that there are always multiple up-to-date copies of the server. Companies can choose the level of protection that best suits their needs, from simple nightly (off-peak) backups, to more complex backup and archive schemas where mirrored volumes are swapped in and out, archived and re-synchronized.

Migration

Migrating from a legacy system can be one of the most costly endeavors an organization can make. Without the proper planning or the proper tools, application migration can often negate the benefits of the new system. Oracle's migration tools include complete calendar data migration for applications such as Exchange and Meeting Maker, ensuring a smooth and secure transition to a real-time, scalable environment.

For 3rd party systems such as Sun ONE that can export calendar data in iCal format, organizations can use the uniical utility to migrate the data over to Oracle Calendar. In fact, any Calendar data that is in text format may be massaged into iCal format and imported using the uniical utility. More sophisticated tools that support vToDo and vCard can be developed with the Calendar Software Development Kit.

Microsoft Exchange Migration Tool

Oracle's migration solution comprises a specific set of utilities for the migration of Exchange systems. These tools provide the complete migration of email and calendar data from multiple Microsoft Exchange servers to a consolidated Oracle

environment. The accounts are first created in OID, which can act as the master directory server, or be synchronized with an existing directory server, then followed by the migration of user data into the Oracle repository. The migration tool encompasses email, calendar, notes, journal, task and contact data folders, as well as any subfolders that users may have created. While basic import and export utilities can be used to migrate calendar data, the Oracle migration tool maintains all the meeting attributes, including information such as attendee lists and attendance status. This means that the original value of the data is maintained and companies can use it as a foundation to build a better collaborative environment. Furthermore, since the migration window is completely configurable, organizations can take advantage of the opportunity to clean out and archive older data, ensuring that on relevant information is used to populate the new Oracle system.

CONCLUSION

More than just personal information management, Oracle Calendar is time management built for a suite. Leveraging the power of Collaboration Suite, Oracle Calendar enables members of an organization to organize collaborative activities from any location or device, providing up-to-date availability information, resource management through integrated workflow, easy access to shared documents and the ability to schedule and participate in Web Conferences.

Access to information is paramount to an organization's "knowledge worker" strategy and is at the heart of the Oracle Calendar solution – from desktop to web to mobile device synchronization, users have an extensive choice of access channels. And from tight integration with Collaboration Suite, organizations can further empower their employees with a complete collaborative environment.

Since time data is exactly that, time sensitive, restricting it solely to the confines of a Calendar application limits its usefulness. Rather, Oracle Calendar is a platform that enables users and applications to access that information at all times. Whether using the time bar in the Web Access client to check on upcoming meetings, or using the Calendar portlet in the Collaboration Suite Portal to get an overview of the day's events, or receiving an alert for a web conference that is starting, employees are constantly in reach of their important activities.

Finally, by not only supporting, but leveraging open standards, Oracle Calendar sets the stage for even tighter integration with all functions within an organization. Not only do open standards play an important role in Oracle's vision, Oracle is active in helping define the requirements for new and emerging standards. Through initiatives such as The Calendaring and Scheduling Consortium (www.calconnect.org), Oracle is working together with other vendors to help shape the future of time management.

Oracle's forward looking development will continue to build upon technologies such as the OMA-DS-based Mobile Data Sync and Web Services – ensuring that organizations can offer collaborative services beyond the limits of the corporate network – reaching customers, suppliers and partners.

RELATED READING

Visit the Oracle Technology Network at: www.oracle.com/technology/index.html to review the following papers:

Oracle Calendar, Data Sheet

Oracle Calendar, Co-existence with Microsoft Exchange

Oracle Calendar, Deployment Considerations

Oracle Calendar, Development Tools Fact Sheet

Oracle Collaboration Suite, Technical White Paper

Oracle Mail, Technical White Paper

Oracle Mobile Collaboration Server, Technical White Paper

Oracle Real-time Collaboration, Technical White Paper



White Paper Title

June 2005

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