TimeControl® Online

Security Architecture

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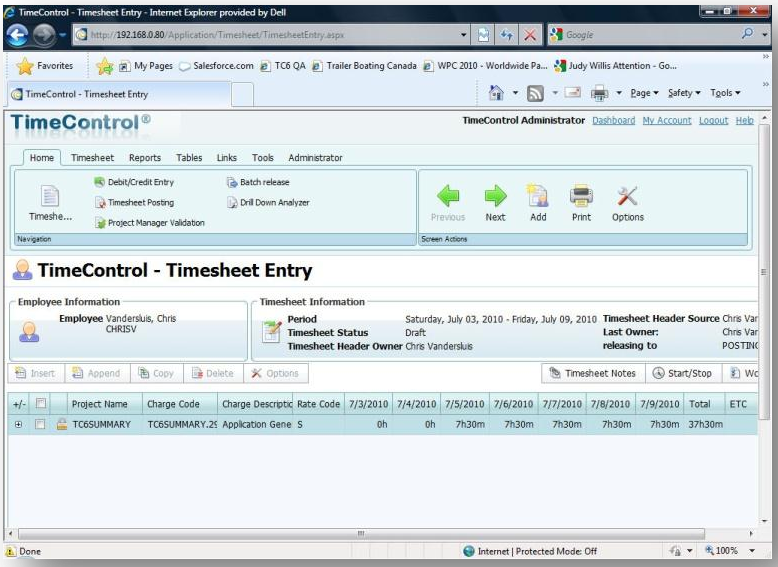
Overview

HMS has been designing corporate timesheet systems since its first project in 1983. Our clientele includes organizations in both the public and private sector. Whether the client is a 10 user IT company or a Fortune 1000 multi-national, the security of the TimeControl timesheet environment is a critical concern. A timesheet may be used for only a few minutes per week by most users but the data it contains can be used for the most sensitive requirements including billing, payroll, government regulation compliance or auditable tax purposes. HMS has designed TimeControl with these concerns in mind.



TimeControlOnline is the hosted in-the-cloud subscription service of TimeControl.

Of any data for which the security is important, timesheet data is often considered the most sensitive. If used for payroll, timesheet data contains the salary costs per employee. If used for project management, timesheet data reveals the true actual costs of accomplishing elements of work. In the wrong hands, this data has the potential to cause heartache for management of the organization.

When we discuss security, we must first consider what we mean by it. Here we'll look at perspectives including the system security including the database architecture, data encryption, the TimeControl communication layer, TimeControlOnline's functionality architecture, working across the Internet and related topics of interest. We'll also cover the hosting system design and architecture. TimeControlOnline uses Amazon's EC2 infrastructure and there are numerous aspects to TimeControlOnline's security that are interwoven with the Amazon architecture.

This paper was written for those with a good understanding of technical issues such as firewall architecture and Internet Web-based security.

The fundamental driving force behind TimeControl security architecture is to a) deny access to unauthorized personnel to data they have not been granted access to, b) protect TimeControl data from unauthorized tampering or corruption and; c) to protect corporate infrastructure from using TimeControl to gain access to gain access to other corporate resources.

Amazon EC2

HMS uses the Amazon EC2 service which is used by some of the most recognizable publishers of software services to deliver a highly robust and reliable system architecture. Information from Amazon on the security compliance of their architecture as well as their numerous certifications and accreditations can be found at aws.amazon.com/security.

TimeControlOnline runs on the Amazon EC2 environment. Information on the network architecture and the layers of security which exist prior to any potential threat even reaching the TimeControlOnline hosted servers can be found at aws.amazon.com/security.

Amazon security certifications

According to Amazon, they have past successfully completed multiple SAS70 Type II audits, and now publishes a Service Organization Controls 1 (SOC 1), Type 2 report, published under both the SSAE 16 and the ISAE 3402 professional standards as well as a Service Organization Controls 2 (SOC 2) report. In addition, AWS has achieved ISO 27001 certification, and has been successfully validated as a Level 1 service provider under the Payment Card Industry (PCI) Data Security Standard (DSS). In the realm of public sector certifications, AWS has received authorization from the U.S. General Services Administration to operate at the FISMA Moderate level, and is also the platform for applications with Authorities to Operate (ATOs) under the Defense Information Assurance Certification and Accreditation Program (DIACAP). We will continue to obtain the appropriate security certifications and conduct audits to demonstrate the security of our infrastructure and services.

Physical Security

The Amazon infrastructure is housed in Amazon-controlled data centers throughout the world. Only those within Amazon who have a legitimate business need to have such information know the actual location of these data centers, and the data centers themselves are secured with a variety of physical controls to prevent unauthorized access.

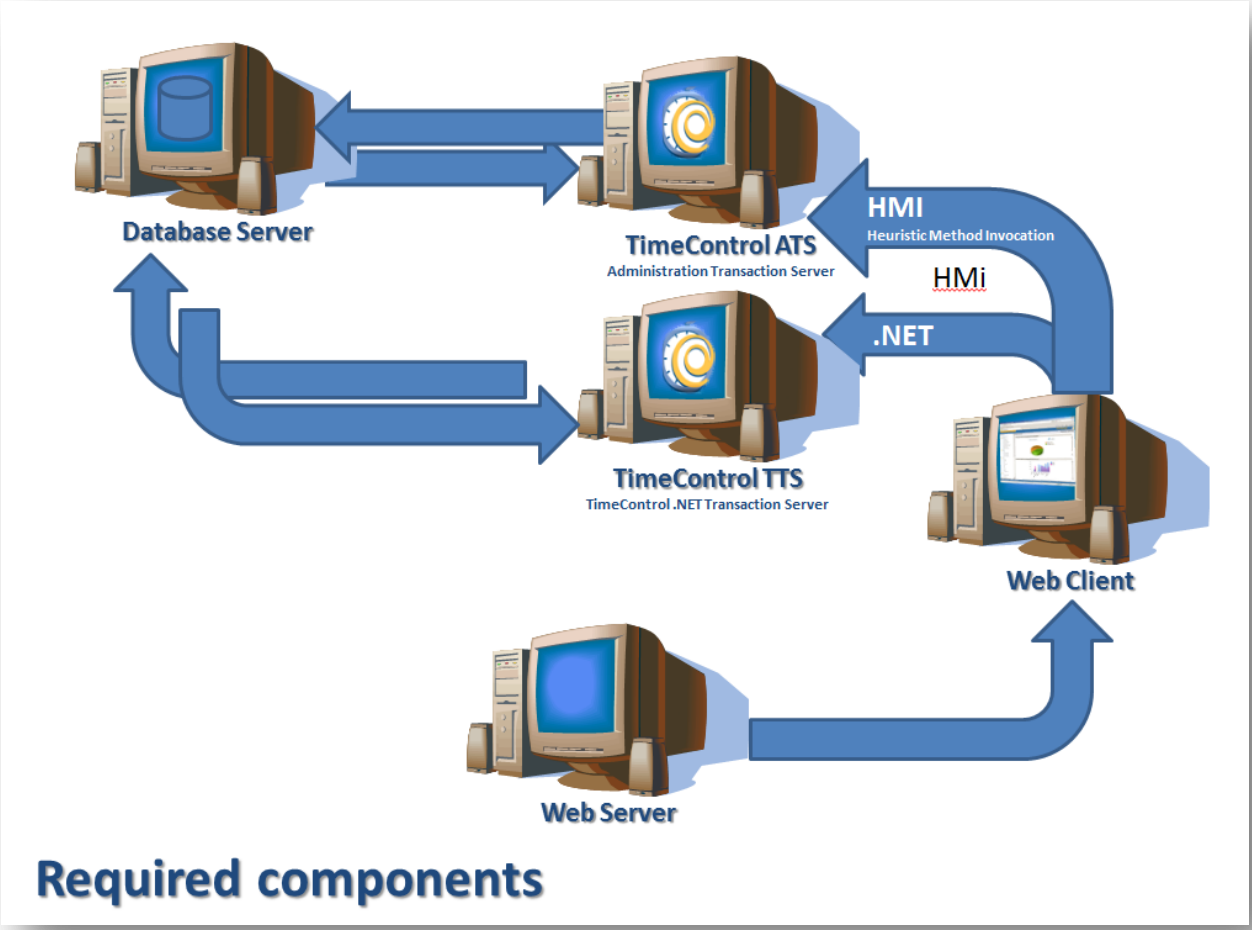
Secure Services

Each of the services within the Amazon EC2 environment contains a number of capabilities that restrict unauthorized access or usage.

For more information on the physical security, secure services that are automatically part of the EC2 environment and how Amazon monitors and defends against external threats, visit aws.amazon.com/security.

TimeControl Components Overview

TimeControl has some key components that are critical to its system operations and HMS has used these components to implement TmeControlOnline as a service. TimeControl is an n-tier application with a design that allows for the system to be infinitely scalable. The key components include a Database Server, the TimeControl Administration Transaction Server middle-ware, the TimeControl Transaction Server Middleware Web Server components and the web-based client. We'll describe these components in more detail here.



Database Server

TimeControlOnline stores all of its data in a MySQL database. This database is housed on a server which is internal to the TimeControlOnline network.

There are numerous database versions supported. To check if a particular version of your database is supported, contact HMS Software's support services at support@hmssoftware.ca.

Administration Transaction Server (ATS)

TimeControl's middle-tier layer is a proprietary system called the Administration Transaction Server or ATS. The ATS translates requests from the web based client interface into SQL database commands that the database can understand and sends the data required from the database back to the user's terminal.

The ATS contains an extensive selection of functionality but can only be talked to by the client interface. Aside from the database, the ATS can also communicate directly with some server-based project management software such as Microsoft Project Server or Primavera. This is in addition to the client-based project management links that can be effected from an end-user's terminal.

While the ATS is often exposed to the outside world through the Internet, having a middle-tier layer like this makes for a highly secure system since the database server and database itself are isolated from the outside world.

The ATS runs as a Windows Service which starts automatically on the Windows Server. Multiple instances of an ATS can be established on the same server.

TimeControl Transaction Server (TTS)

Starting with version 6, TimeControl includes a 2nd middleware component called the TimeControl Transaction Server or TTS. The TTS is a .Net web service which interfaces with web-based .Net components and interacts with the database. The Microsoft .Net architecture is highly secure. In early versions of TimeControl 6, the TTS will manage the server-side commands for the timesheet, approvals, Debit/Credit adjustments, the dashboard and the User Options/My Account area. In future versions more and more of the ATS will be migrated into the TTS structure.

The TTS runs as a Windows Service which starts automatically on a Windows Server. Multiple instances of a TTS can be established on the same server. The TTS is typically installed on the same Windows Server as the ATS.

TimeControl Scheduler Service

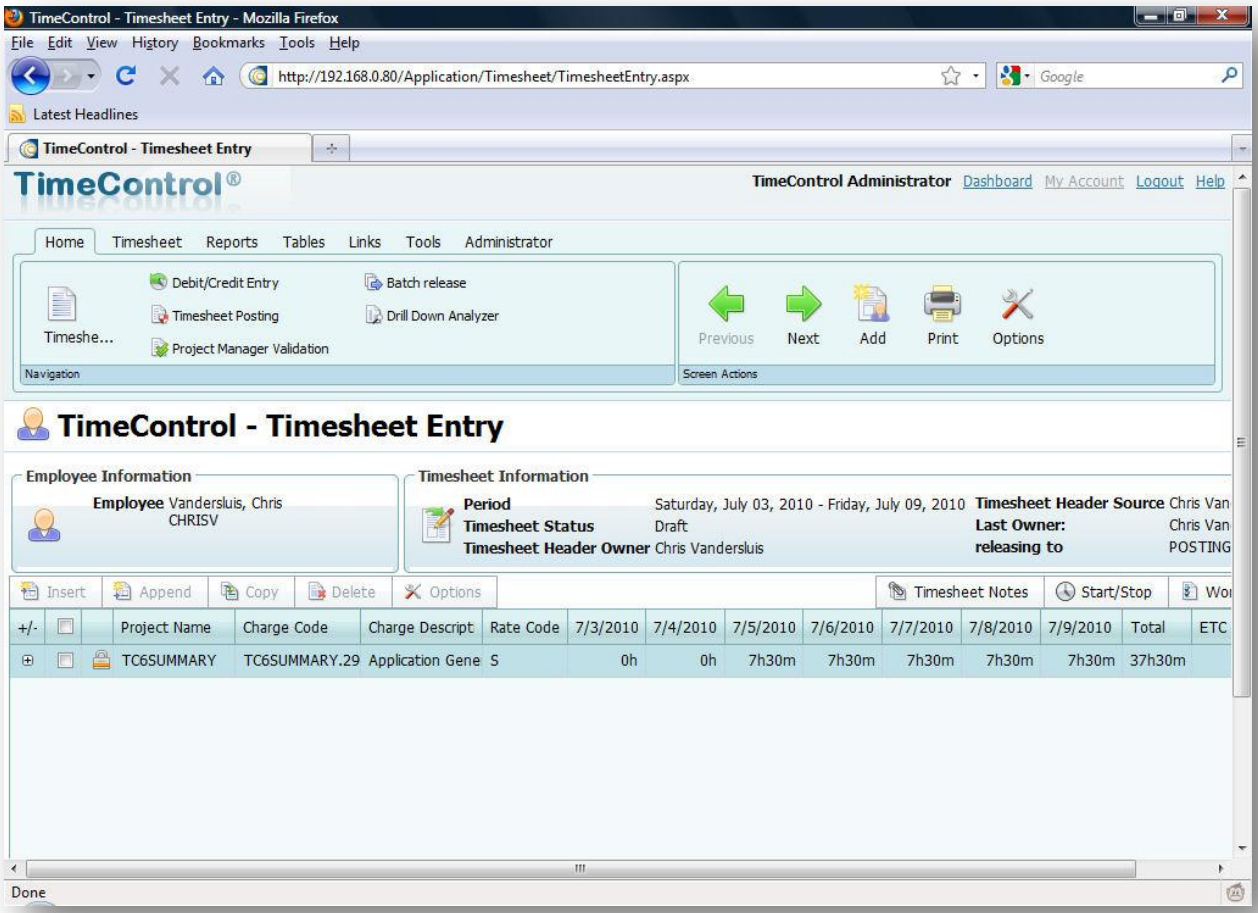
There are several automated functions which can be run as scheduled events within TimeControl. These include unattended emails sent on a schedule, for example, when timesheets are missing and overdue or the posting of timesheets or linking of TimeControl to server-based project management tools. To manage the schedule of these events, the TimeControl Schedule Service is installed on the same Windows Server as the ATS and TTS.

Web Server

TimeControl 6 users are presented with a browser-based web interface written in an AJAX (Asynchronous JavaScript and XML) structure. To deliver this interface to the browser, TimeControl uses Microsoft's Internet Information Services (IIS) which is included with every Windows Server.

Timesheet Web Client

The TimeControl web interface requires a web browser. Numerous browsers and hardware platforms are supported. TimeControl 6 works with Internet Explorer, Firefox, Chrome, Safari and Mozilla.



The multi-browser functions are those which do not require an ActiveX. This includes the timesheet, approvals, Debit/Credit adjustments, the Login and Dashboard and the Options/My Account page.

Administrator Web Client

Additional functionality in TimeControl 6 is available to administrators. These functions may require the installation of ActiveX components. If so, accessing these components for the first time, the user will be asked for permission for TimeControl to install several ActiveX controls. Only those users who require TimeControl's administrative functionality require the installation of these ActiveX components. Administrators can also install the ActiveX controls using the supplied MSI installation packages which can be "pushed" using Active Directory or other push technologies.

Communications: .Net

TimeControl's user web client uses Microsoft's .Net architecture to communicate between the web page and the TimeControl TTS middleware service. This is a highly secure, encrypted

environment which uses a streaming object protocol to package data and transmit it quickly from one end to the other.

Communications: HMI

TimeControl's administrative functions must communicate also. The ActiveX components communicate with TimeControl's Administration Transaction Server middleware service using a proprietary communications layer developed by HMS Software. Heuristic Method Invocation (HMI) is a socket-level encrypted object-streaming communications protocol. What this means is that once the end user has logged into TimeControl, every communication between his or her terminal and the TimeControl Server will be encrypted and protected. This would make compromising a TimeControl transaction between the ActiveX Control and the ATS while enroute extremely challenging. You may require opening a specific port for HMI communications so administrators can access these functions. HMS will supply you with the port number when you subscribe to TimeControlOnline.

Database Access

TimeControl's data is stored in a relational database. It does do calculations but is primarily designed to collect, summarize and report on data that has been collected in a very structured and stable manner. Access to and protection of the data is, therefore, our primary concern.

The TimeControl data architecture is designed with a 2-database structure. The primary database contains all the tables, fields, indices, constraints etc. that are required to operate the program. A secondary database is used for gateway purposes and contains only one table with one record and two fields.

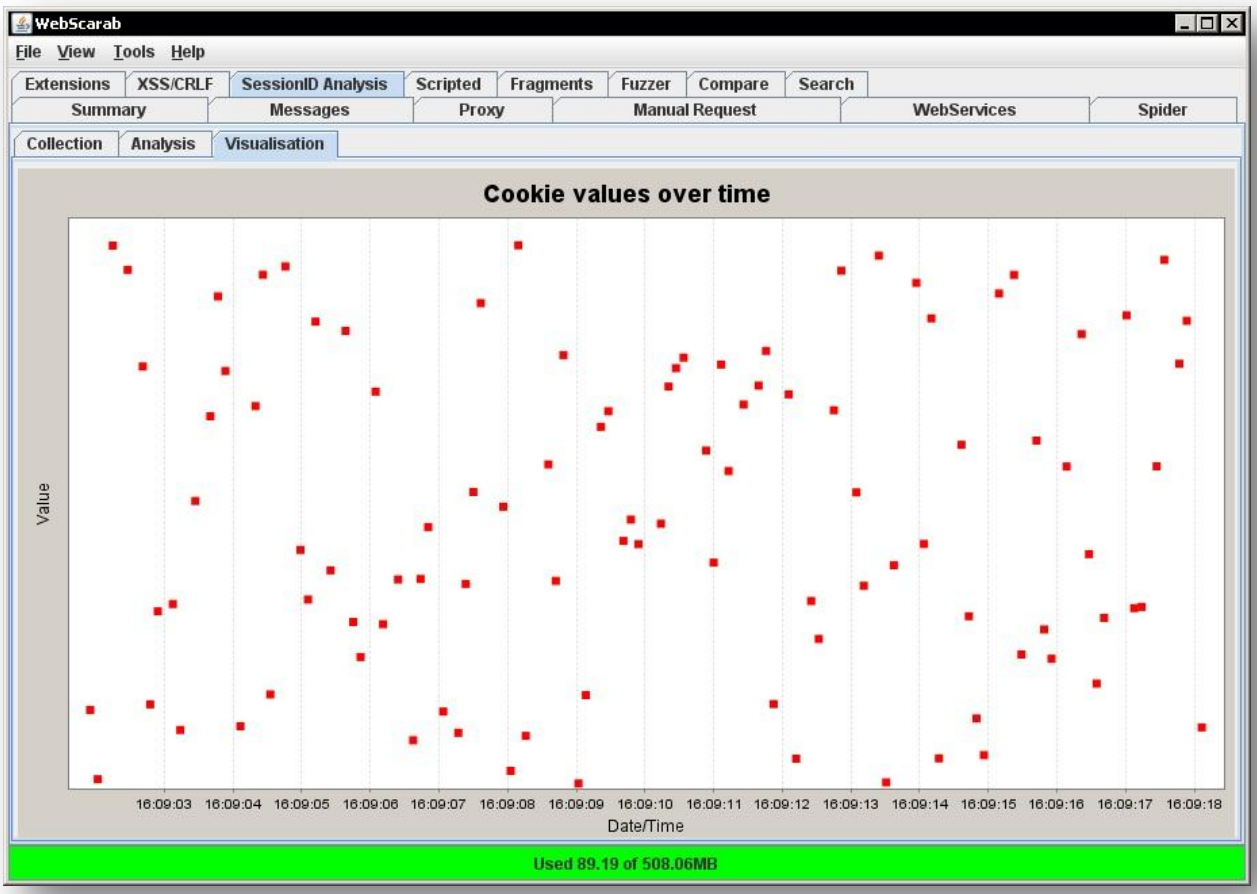
One of the HMS design team's concerns was allowing access to this database to anyone who could reach the server. The use of a security gateway database was designed to defeat this. The gateway database contains a single username and password used to gain complete access to the main TimeControl database where all the TimeControl data is contained. The security data is encrypted with a method hard-coded into the TimeControl applications. This provides an additional level of insulation of the main database.

When starting, the TimeControl middleware; the Administration Transaction Server (ATS) and the TimeControl Transaction Server (TTS) starts up and looks in its startup definition for the location of the security database. It along is given a username and password to access this database. Once the ATS or TTS has reached the security database, it decrypts the username and password contained there to determine how to make a connection to the main database. The ATS and TTS then establish a connection to the database and stands by for requests from the client-access controls such as a TimeControl .Net control or ActiveX component to make a data request. All data is brokered through the middleware. No TimeControlOnline end-user or Administrator is given any knowledge of the database location and no user ever makes a direct connection to the database.

TimeControl's maintains login information in the database along with encrypted storage of passwords if TimeControl passwords are used (other authentication options include LDAP and Active Directory support). But what if the complete call to the TimeControl server including the Session ID was copied and sent. Could someone identify a pattern of Session IDs and thus try over and over to get into the system with them until they luckily got into the system as an administrator?

This would be extremely difficult.

Session IDs are randomized in the TimeControl environment. Using WebScarab, we can see an analysis of numerous logins and calls to the TimeControl server. Session IDs that were, for example, sequential would show as a visible pattern.



It is obvious that there is no discernible pattern to these session IDs here.

Access Control

During login, TimeControl uses server-side authentication of a user name and password combination to determine if a) the user has an authenticatable login and, b) what rights the user has. Then the TimeControl server establishes a session ID and returns that session ID to the client station. The ID allows session variables to be maintained and for authentication to be remembered.

No authentication status of the user is ever stored and submitted from the client side for any module so exploiting an “authenticated” parameter is impossible. TimeControl’s middleware server checks for each and every access to a module based on who the user is to ensure that the user has the appropriate access at that time. If a user’s right to a module were to be revoked by a TimeControl Administrator, the next time the user would attempt to access that module, even a few moments later, they would be denied.

There is never a session authentication token with login information included in a transaction to TimeControlOnline and no sensitive information which could be intercepted in the URL and then used by anyone to gain access to something they didn’t have rights to.

It is important to remember also that someone would need to get this string even to be able to start manipulating it. If someone were able to defeat the SSL encryption and capture this string, all they would have is the menu call for a module of TimeControl. Without also having a) a valid login to TimeControl and b) having that login have the rights to this menu item, they would have no access to TimeControl at all. Even to capture this information, the intruder would need to either get physical access to the client station as its being used or try to intercept the data as it is transmitted to the server and that data is encrypted both by Windows .Net and by the Secure Socket Layer (SSL) encryption.

Secure Socket Layer Security in TimeControlOnline

Access to the TimControlOnline site is encrypted using SSL (Secure Socket Layer) just as you would in a banking or purchasing website. This technology results in all traffic to and from the page being encrypted by the web server. Even the movement of the user name and password to be encrypted before it arrives at the server.

TimeControlOnline's SSL Certificate

Testing of the TimeControl.net SSL Certificate was done at: www.networking4all.com.

Testing Results:

- ✓ SSL Certificate is not expired
- ✓ Site is listed in the certificate
- ✓ Organization details are listed
- ✓ Encryption strength is at least 1024-bit
- ✓ Signature Algorithm is strong
- ✓ Accepting only high encryption cipher suites
- ✓ No connection upgrade to 128-bit for old browsers
- ✓ No Extended Validation on company details
- ✓ No Debian weak key present
- ✓ No known security issues for this Certificate Authority

Subject Alternative Name (SAN)
This SSL Certificate has 2 subject alternative name(s). This means that this SSL Certificate is not only valid for *.timecontrol.net but in this case also for the alternative names *.timecontrol.net, timecontrol.net

Organization details
The identity of the owner of this domain/certificate has been validated. The details can be retrieved from the certificate.

Encryption strength
The SSL Certificate has a 2048-bit length private key. Longer RSA keys are required to provide security as computing capabilities increase. The recommended RSA key-length is 2048 bits. Although a 2048-bit RSA key length is more secure than the common 1024-bit length, it is also slower and might affect server performance. Most web servers continue to use 1024-bit RSA keys without negatively influencing security for normal operations

Signature Algorithm
The SSL Certificate is signed with a sha1WithRSAEncryption method which is an accepted secure standard algorithm for signing certificates. The less secure MD5 algorithms can be potentially manipulated during the signing process and should no longer by used

Cipher Suite
This site only accepts connections with a strong cipher suite and will not allow weak encryption for SSL sessions.

Server Gated Cryptography (SGC)
This certificate is not able to create a 128-bit secure connection for older browsers. The certificate has no SGC, Server Gated Cryptography support which will upgrade a 40-bit connection to a secure 128-bit connection.

Extended Validation (EV)
This SSL Certificate will not display a green address bar in the visitor's browser, nor the identity of the website owner or the Certificate Authority. EV SSL Certificates have the highest level of trust and security.

Certificate Authority Security Issues
There are no known issues with the Certificate Authority who issued this SSL Certificate.

Debian Weak Key
This SSL Certificate is not affected by the Debian weak key problem. Between September 2006 and May 2008, Debian-based servers have generated weak keys. Once a hacker finds a server using a weak key, he can use the public key to find the private key.

Password encryption

Okay, so you've got access to the TimeControl login page and now TimeControl would like to determine if you should be granted access to the application at all.

Once the login is complete, control of TimeControl communications is now passed to the ATS and TTS. TimeControl determines through its User profiles what menu items you should have access to and presents a menu with only those items.

Each user is given access to TimeControl based on a user name and a password. Within the TimeControl database a table is maintained of these values. The password values are encrypted within the database so that even if someone is given casual access to that table, they could not easily determine the password value for a user.

User name / password combinations are stored as encrypted temporary "session variables" by the web server for as long as the browser session is active. Once logged in, the user name and password are no longer transmitted back and forth. the authentication is managed on the server in order to protect TimeControlOnline from 'man-in-the-middle' attacks.

When each TimeControl component is accessed by the user, TimeControl determines if the session user is still approved for this component. If so, it displays the component to the user. This prevents end users from trapping a full component URL then trying to access it later with a user name and password which should no longer deliver the component to the end-user. Because the user name and password are never sent as part of the URL, this type of attack is not possible.

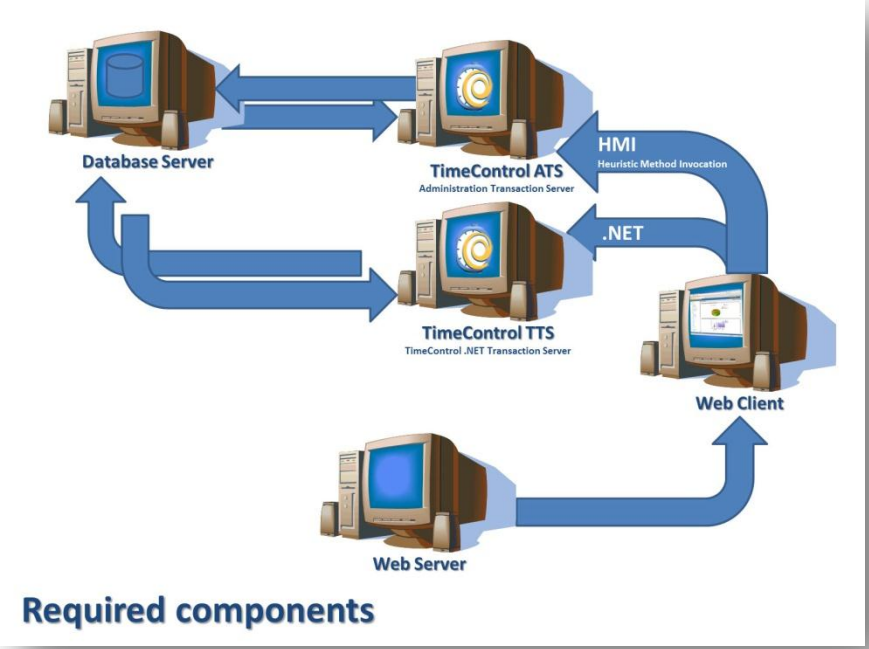
TimeControl sessions are designed to time-out after a set period of time so that even if the user leaves their screen open to TimeControl inadvertently, the log in session will expire automatically.

Middleware n-tier Architecture

Modern web-based interfaces are either all server-based, which means that all the processing occurs at the web-server and the client only sees what looks like a web page or they are thin-client architecture which means that some of the work occurs on the server and some of the work occurs at the client's station. TimeControl is a thin-client design.

With some of the work occurring in-between the client and the database, TimeControl's architecture has multiple levels. Each level is usually called a 'tier'. Because TimeControl has been designed to have an unlimited number of middle tier installations, TimeControl is defined as an n-tier application.

N-Tier design is important when we talk about security as it allows us to restrict access to corporate resources. Regardless of whether or not a firewall is implemented, end user components are connected only to the TimeControl middle tier, not ever directly to the database server allowing us to protect the database server much more stringently.



The sequence of events in making TimeControl function is as follows:

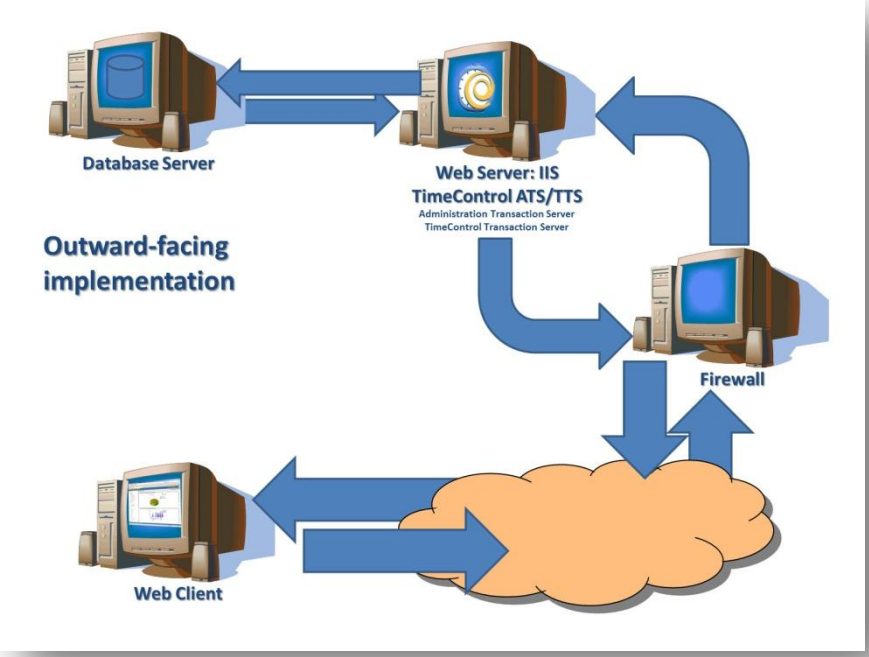
1. The end-user web browser accesses the TimeControl login web page on the web server.
2. A TimeControl component at the Web Server communicates with the TimeControl Administration Transaction Server (ATS) middleware and the TimeControl Transaction Server (TTS) to determine if the user should be granted access and, if so, what menu items should be displayed
3. The Web Server sends the TimeControl menu back to the client's web browser with instructions to the TimeControl components on how to connect to the middleware
4. The TimeControl components are activated by the end user by selecting a menu item
5. If the component is an ActiveX, the selected TimeControl component then communicates directly with the middleware. This HMI communication layer is

completely encrypted. If the component is a .Net (such as the timesheet) then the component communicates via the web server and the .Net protocol which is also completely encrypted.

6. The TimeControl middleware brokers any traffic and makes the appropriate interaction with the database server.

At no time does the end user machine communicate directly with the database server.

In TimeControlOnline, a firewall is in use. This allows us to insulate servers of the TimeControlOnline environment such as the database servers and other components using NAT (Network Address Translation) which further protects key elements of the system.



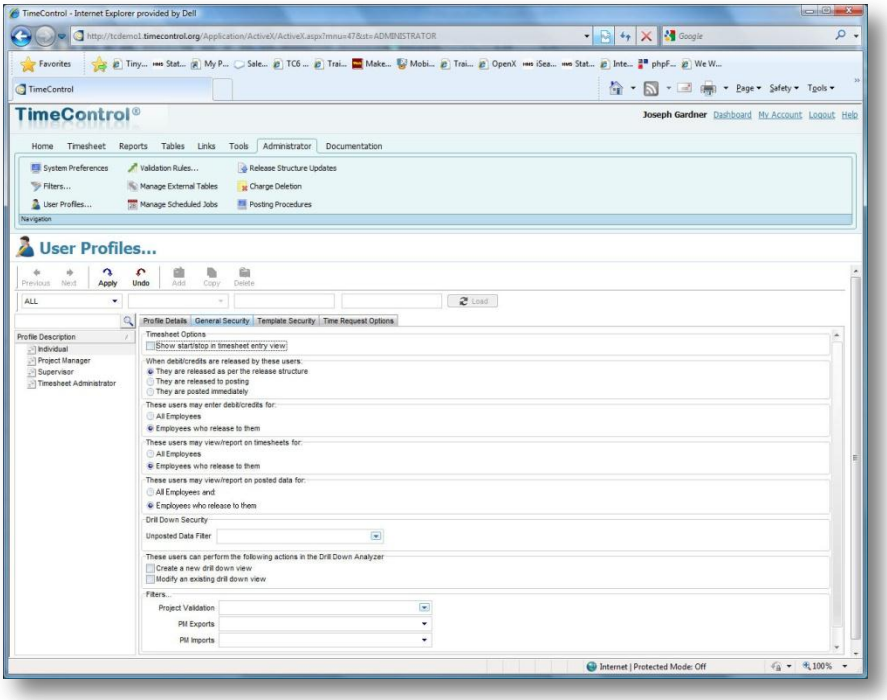
This is a very secure environment. The only area which is even vulnerable to attack is traffic on its way from the web browser client outside the network to the middleware machine inside the network. A worst-case scenario is that traffic to or from the middleware would be corrupted through malicious intent and this traffic is encrypted with an advanced encryption algorithm. Since the middleware only accepts data that meets the proper business rules, this type of attack would, at worst, cause an erroneous transaction, which would be rejected by the TimeControl transaction server.

HMS closes all ports in the middleware server which are not required for TimeControlOnline use in order to further harden the server.

Functional Access Control with TimeControl User Profiles

Once in TimeControl itself, there are extensive security structures in place to ensure that users are presented only with the functionality and data they require. The most significant of these is managed through the User Profile area. User Profiles is part of each of the TimeControl editions. This architecture ensures that users are not required to wade through areas of the system that are of no interest to them trying to find the functionality that they do require. This makes end users more effective when using TimeControl.

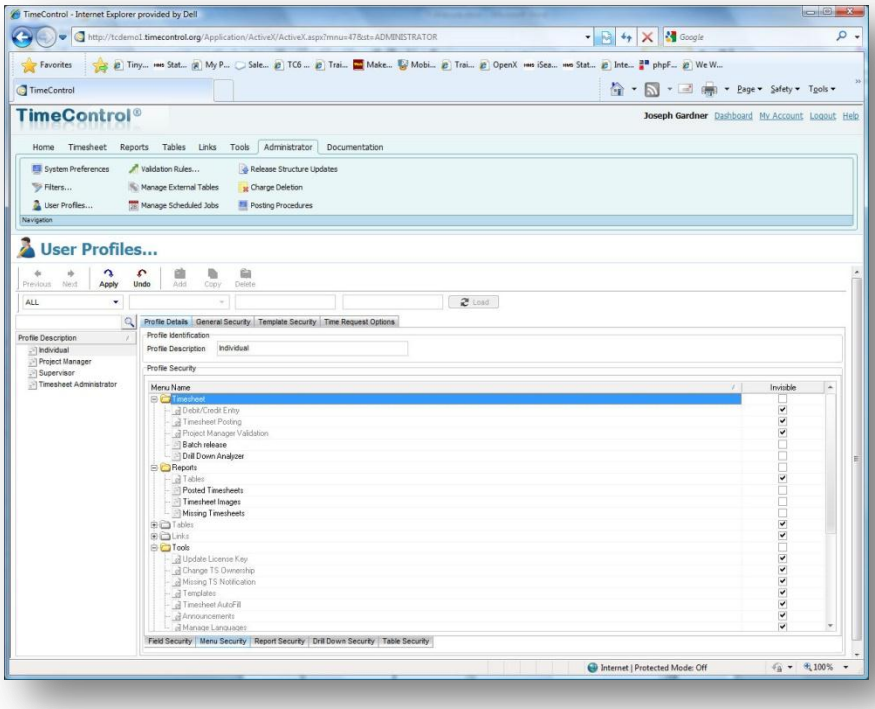
This same architecture ensures that only the data appropriate to that user is visible. The User Profile area is divided into two sections. The Data Section determines which open timesheets and which posted timesheet data can be viewed. An Administrator can define roles such as a supervisor who can see only data for people below them in a release structure or define the data explicitly through the use of filters.



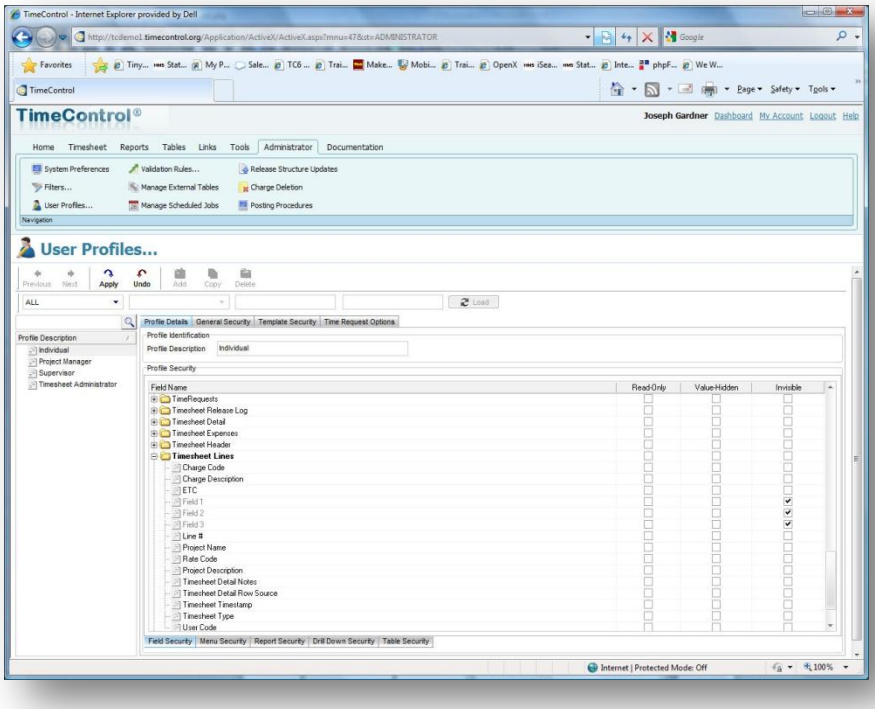
In addition to the data restrictions put on reporting and exporting by User Profiles, end users can also be restricted during data entry from seeing different project and charge code selections by imposing employee-level filters in the employee tables. This ensures that only data that is appropriate to the proper level of use is seen.

The second area of User Profiles is a lower level of detail. The Details tab controls first the functions that are available to each user. This allows an administrator to hide completely any aspect of the program including such things as table access, exporting functionality, project linking functionality, definition and configuration areas etc. This type of function-by-function security is essential in such an application.

The Menu Security area can be defined at any level of the menu. Top level entries result in that entire tree of the menu structure to be made invisible. If a particular user requires use of a menu item somewhere in the tree (for example just one of the tables), each other item in that area must be made invisible.



The Report Security works just like the Menu Security area except that it occurs at the report listing level. This allows an administrator to give access to some report but not all reports and define the access, report by report. Remember, that the Data Security already discussed comes into effect whenever a report is offered. This ensures that even if a report format is available to a user, they will not be able to see data to which they do not have rights.



The last area is quite unusual in an application like TimeControl. It allows security to be established field-by-field. The Field Security area of TimeControl allows virtually any field to be declared Read-only, Value-hidden, or Invisible. Declaring the field “Read-only” makes the field non-editable in any table where it is displayed

for this user. Declaring it “Value-hidden” leaves the field visible buy won’t show the value within the field. This will also result in data not being displayed for this field if the field is contained in a report run by this user.

Declaring a field “Invisible” makes not only the field, but also the field’s label to not be displayed. If the field exists in a report definition, the field column and data will be suppressed at run time when run by a user with this restriction.

Here’s an example, of where Field Security might be critical:
TimeControl supports approximately 1300 rate codes per employee. For each rate code, TimeControl maintains 2 values. These values are often used to track internal costs such as actual salaried costs vs. external costs such as billing or project costs. A project manager might be given access to the external cost fields within the rate table but not be allowed to scroll through the rates to see the salaries of all the employees. For the project manager, the 2nd field would be made invisible. Yet a human resources employee might be given access to the rates table to update the actual salaried costs. For this person, the project field would be made read-only to ensure the billing value would not be updated inadvertently.

24x7 Monitoring of TimeControlOnline

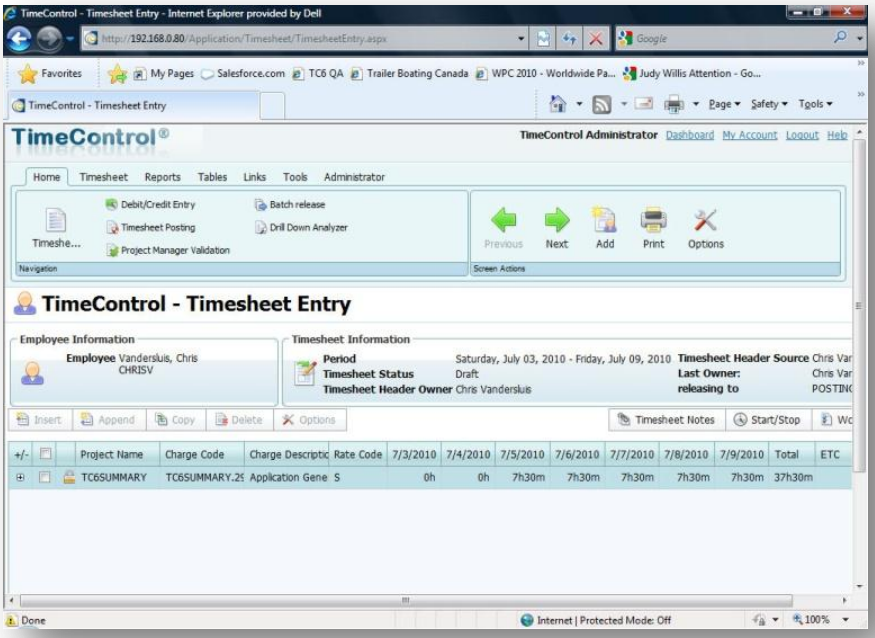
As an online service, TimeControl can be accessed by users from anywhere in the world in any time zone possible. We use multiple monitoring services to check on TimeControlOnline 24 hours a day, 7 days a week and, in the case of an emergency, automatically update key HMS staff regardless of the time.

Amazon Monitoring

Amazon's EC2 provides a service called CloudWatch which HMS uses to monitor the health of the TimeControlOnline environment. The service currently makes available 26 different metrics. HMS uses the Cloud Watch service to monitor the TimeControlOnline service in real-time for events such as the stoppage of service as well as the server experiencing overload from, for example, denial of service attacks which Amazon might not have intercepted. Alarms from CloudWatch generate emails which are sent to the 3 HMS Staff with the authority to access the server and determine the nature of the difficulty.

Independent Monitoring Service

In the event that whatever problem with Amazon that would have TimeControlOnline not be available has also affected the Amazon CloudWatch service, HMS uses an independent monitoring tool to check on the availability of TimeControlOnline 24 hours a day. This service is capable of determining if a key page has been manipulated and if that page is being served at a reasonable speed. Any variant from this results in emergency emails to key HMS personnel who can intervene regardless of the time.



In today's challenging economy, tracking productivity is more important than ever. It is no longer enough to know only how much time has been spent. Now management demands that you know what was done with the time. Many organizations are turning to project and task based management as a way of being more effective. One of the most difficult aspects of implementing project control is the capture and approval of labor actuals. *TimeControl* provides an electronic timesheet system designed to serve both Finance and Project Management

Install On-premises or subscribe in the Cloud Online

TimeControl is avialable both as a purchasable license to be installed on your premises or in a subscription model with our Timesheet as a Service TimeControlOnline. You can find out more about our online subscription at www.timecontrol.net.

Open Architecture

TimeControl is an open architecture system which supports a variety of databases including Microsoft SQL Server, Oracle, Sybase and MySQL. Customizable user profiles allow the *TimeControl* interface to be tailored to each user's requirements.

Easy to use web interface

TimeControl's interface is browser-based and user-intuitive. User Profiles determines what the user will be presented with and the user can define where TimeControl should start and what defaults they wish. End users can use a variety of browsers such as Internet Explorer, Firefox, Chrome, Safari, Mozilla or even an iPad. (Administrators must use Internet Explorer.)

TimeControl Mobile is included

TimeControl includes ***both*** a browser-based web interface ***and*** a mobile interface that can be used from your Smartphone. Whether you use an iPhone, Blackberry, Android or Windows Mobile7 device, you can access your TimeControl from wherever you are.

Multi-lingual

We know that not every user speaks English as their first language. TimeControl comes with a number of languages already in the system but every label and every message is open to the TimeControl Manage Languages module so you can change the existing translations or even add your own. This is a great feature for adjusting terminology in the system to match your organization's (The only word you can't change is: "TimeControl").

Timesheet Approvals

TimeControl supports HMS Software's unique Matrix Approval Process for Labor Actuals which allows for quick authorization of project data. This process resolves the inherent conflict that is found when both the financial and project management hierarchies must approve timesheet data simultaneously. Automated validation of timesheet data is handled by TimeControl's remarkable Validation Rules . Additional approvals can be done manually with a simple Approve/Reject or Approve/Update process. The Project Manager Validation screen displays an easy-to-view hierarchical interface for managing project approvals.

Total Flexibility with User Profiles

TimeControl's User Profiles allows the Administrator to determine which menu choices, reports and fields are accessible by each user. The entire interface can be tailored to the user's individual needs. No other system on the market today offers this much flexibility.

Field level security ensures that only the information which is important to each user, is displayed. Fields can be made read-only or invisible, removing them from view entirely. This makes *TimeControl* at once a secure, deployable system and an easy-to-use one as well.

Links to Project Management Systems

TimeControl includes direct links to project management systems including Oracle-Primavera versions P3 through the most current P6, Deltek's Open Plan and Cobra and Microsoft's Project, and Project Server. In fact, multiple products and versions can be supported simultaneously.

Integrating with a project management system drastically reduces timesheet errors as only valid tasks will be available in which to charge time. Hours entered in *TimeControl* are returned directly to the project management system as activity and resource progress.

TimeControl also supports customizable export formats for integration with virtually any financial or HR system.

Vacation Approvals with TimeRequest™

The TimeRequest module allows users to make a request for certain types of times to be approved for entry in future timesheets. The most common application of this module may be for requesting Vacation time off. Once approved, the time is then automatically entered by *TimeControl* into the appropriate future timesheet.

The TimeRequest module is, however, not restricted to just Vacation requests. Any category of time can be exposed to the module. This allows an infinite number of applications such as for

travel time, training time, offsite or onsite time or any other type of time category where the organization wishes it to be approved in advance.

E-mail Enabled

TimeControl allows email notifications to be sent for various events such as missing timesheets, incomplete or non-approved timesheets as well as timesheets that were rejected or re-released for approval.

Expense Reports

TimeControl includes extensive expense report functionality. Users can enter an unlimited number of expense report items for each timesheet line.

Links to Payroll, HR and ERP/Finance

TimeControl is designed with a Links module that lets you define links to corporate systems and software including Payroll software or online services, Human Resources systems and ERP/Finance systems.

Using TimeControl to fulfill the requirements of not only project management but also Finance, HR and Payroll means you can eliminate the costs and inefficency of mlutiple timesheets.

Reporting

TimeControl's reporting engine looks just like Excel™. Reports can even be saved in Excel or HTML format.

TimeControl's Reporting Wizards make report generation easy. *TimeControl's* field-level security is always active so only the fields which a user has permission for will be shown.

Predefined reports are available in a variety of formats which include posted timesheet data, table lists, printouts of the timesheets themselves and missing timesheet reports.

For more information

For a more complete description of TimeControl and its features, visit www.timecontrol.com. To try the timesheet system for free, visit freetrial.timecontrol.com.

TimeControl Feature List

Easy to use Interface

- Full web-based browser interface with multiple browsers supported
- TimeControl can be implemented within a SharePoint interface or a Microsoft Project Web Access interface
- Scaleable user profiles facilitates use for data entry users yet provides full functionality for administrators
- Multilingual with multiple languages included
- Unlimited charge codes displayed in simple, hierarchical drop-down lists
- Unlimited free-form notes for each line item and each timesheet
- E-mail-enabled. E-mail messages sent for system notices such as rejected timesheets or missing timesheets
- Scheduleable E-mail notification for missing or unapproved timesheets.
- Predefined timesheets based on resource assignments from the project management system or by user input

Robust Architecture

- Open database architecture; support for Oracle, Microsoft SQL Server, Sybase and MySQL databases
- N-tier architecture makes system scaleable for 10 to 100,000 users
- Unlimited rate codes per employee
- Field-level security. Make any field visible, value read-only, or invisible
- Complete redefinition of every field label
- Complete auditability of timesheet data
- User-defined fields on every table
- Add pop-up data validation for each user-defined field
- Allows charges to be linked to a specific project or project-independent
- Multiple overhead charge types
- Filter charge codes, projects and rates visible to any employee

Web Interface

- MyTimeControl™ home page dashboard gives extensive and customizable dashboard information to employees

Approval Process

- HMS's unique *Matrix Approval Process for Labor Actuals*™
- Unlimited automatic Validation Rules are user defineable, flexible and can be applied globally or to any group or even an individual
- Unlimited manual validation levels in which each employee can have a unique approval routing
- Project Managers or Account Managers can preview and redistribute hours prior to linking with a project management system or exporting to Finance

Links to Project Management

- Direct integration with popular project management systems such as Microsoft Project and Project Server, Primavera and Deltek's Open Plan and Cobra
- Supports multiple project management systems and multiple versions simultaneously
- Customizable import/export function to interface with virtually any finance or ERP system including SAP, Oracle, PeopleSoft and Microsoft Dynamics
- Interface can be integrated directly into SharePoint, Microsoft Project Web Access or stand alone

Time-off Request

- **TimeRequest**™ module allows vacation, personal or other leave time to be requested
- TimeRequest allows multiple levels of approval
- TimeRequest automatically populates future timesheets with approved time off

Flexible Reporting

- Excel-like reporting format allows output to any Windows-compliant printer or reports can be saved as Excel, XML or HTML files
- Reporting Wizards allow an unlimited number of reports to be created and saved for later use
- Unlimited levels of data selection, filtering and sorting
- Drill Down Analyzer provides instant ad-hoc analysis of data at any level

Expense Reports

- Users can enter non-labor costs on their timesheet
- Unlimited number of expense items per timesheet line item
- Expenses can be tracked back to a project management and/or finance system

Government Compliance

- Complies with requirements for DCAA, European Time Directives, FMLA, the California Wage Laws and Sarbanes-Oxley

Hardware Requirements

- Server:
  - Windows Server 32 or 64 bit
  - .Net 3.5
  - Internet Information Services
  - MS SQL Server, Oracle, Sybase or MySQL database
- End-user Workstation
  - Web browsers: Internet Explorer, Safari, Firefox, Mozilla
- Administrator Workstation
  - Web browsers: Internet Explorer

HMS Software Partial Client List

Engineering/Construction
Aecon Construction
AeroInfo
Koch Business Solutions
Kongsberg Devotek
Thompson Beta

Gas / Utilities
Gulf South Pipeline
Acergy
Petrocon
VenCorp
Foster Wheeler

Manufacturing
Alcan
Parker Hannifin
Georgia Pacific
Ultra Electronics
Tennant
Wagner Spray Tech
Vision Systems
Electro Motive
GE Sensing
Tommy Hilfiger

Defense / Aerospace
Bombardier Inc.
CAE Electronics
Lockheed Martin
Rolls Royce
SAAB
Army Corps of Engineers

Government
Amsterdam Port Authorities
Atlanta Airport
Dutch Railway
Government of Saskatchewan
Railway Procurement Agency (UK)
Ville de Montreal
City of Winnipeg

Technology
Arivia
CSI Piemonte
EDS
Face Technology
Fuel Plus Software
GE Access
Microsoft
Positron
Psion Teklogix
Inventure
Fujitsu

Telecommunications
Cable & Wireless Bartel
Ericsson
EXFO
Motorola
Philips Semiconductors
SARA Amsterdam
Stratos Global

Financial
Standard Life
Development Bank of Canada
Alliance One
Centre de Recherche Informatique de Montréal

Health/Pharmaceutical
Boehringer Ingelheim
National Health Service (UK)
Azko Nobel (Organon)
RTS Thurnall
Canadian Institute for Health Info
Iogen
Registrat

Education
Johnson and Wales University
Eastern Michigan University
Queens University
McGill University

About HMS Software

HMS Software, a division of Montreal, Canada-based Heuristic Management Systems Inc., is a leading provider of enterprise timesheet and project management systems.

Founded in 1984, HMS Software's expertise in implementing enterprise project-management and enterprise timesheet systems is recognized worldwide by some of the world's best known organizations. HMS's signature product, TimeControl, an enterprise timekeeping system designed to serve the needs of both Finance and Project Management, is distributed worldwide through an extensive list of distributors and dealers located on every continent with representatives in the US, the UK, Australia, Mexico, Europe, Asia, South Africa and the Middle East.

HMS Software's client list includes some of the world's leading corporations in the telecommunications, IT, finance, engineering, defense/aerospace and government sectors including such organizations as Acergy, Aecon Construction, Alcan, the Atlanta Airport, Akzo Nobel, The Canadian Business Development Bank, The City of Montreal, EDS, Ericsson, General Motors, the Government of Saskatchewan, John Deere, Kelly Services, The UK's National Health Service, Standard Life, UPS, Volvo Novabus and hundreds of others. HMS maintains offices in Montreal, Quebec and Toronto, Ontario.
For more information about HMS, please visit www.hmssoftware.ca.

TimeControl

First published by HMS in 1994, TimeControl has been adopted hundreds of clients and over 150,000 users around the world. TimeControl is designed to serve the needs of both project and finance simultaneously. It allows an organization to use a single timesheet for project tracking, time and attendance, time and billing, HR tracking, R&D Tax Credits, DCAA and project costing instead of having to deploy many timesheets to serve these needs. TimeControl is available for purchase for an on-premises implementation or as a subscription as service. TimeControl's architecture is flexible and extensive supporting numerous databases such as Oracle, Microsoft SQL Server and MySQL, multiple browsers such as Internet Explorer, Firefox, Safari and Chrome and even includes a mobile interface for Smartphones
For more information about TimeControl please visit: www.timecontrol.com.

Strategic Services

In addition to being a publisher of one of the world's best known timesheet systems, HMS provides a full range of support services including technical support, training and consulting tailored to meet clients' specific needs. HMS Software consultants are skilled in activity-based-costing, timekeeping methodology, project management techniques, cost and earned-value management as well, of course, in the HMS-supplied products.
For more information about HMS Software services, please visit www.hms.ca.