

Enhance efficiency and productivity of Clinical Trial with Timetrack

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1. ABSTRACT

TimeTrack is a productivity tool designed to optimize resource allocation and measure team performance. It generates reports to pin-point productivity and resource allocation improvements.

The application was initially developed to provide clients with full transparency on the billing hours of a team. It has become a tool to better analyze a team's productivity, plan future team growth and improve resources allocation. The user enters time allocation for his or her daily activities according to pre-defined categories, sub-categories, studies, initiatives and clients. These fields and related drop down lists are fully customizable according to the client's needs.

Using TimeTrack metrics, a manager is also in a better position to communicate the value of a team by accurately measuring the cost, performance and accomplishments of her team to other departments and upper management.

TimeTrack generates graphical reports & charts that effectively analyze and summarize activities. These reports are tailor-made to the client's studies and initiatives. They can be as detailed as needed and can be generated for any period of time.

This paper shows how to leverage the powerful capabilities of SAS/IntrNet technologies to create and customize time tracking tools to forecast, manage and allocate project resources, and submit invoices.

2. INTRODUCTION

When it comes to productivity and efficiency, wisely choosing a simple and robust tool for time-resource management becomes a crucial choice for a company. Companies such as Clinical Research Organizations must face new challenges posed by time tracking and resource management, as they increasingly become geographically dispersed entities with multi-sites, multi-projects and multi-clients. Managers need to translate time tracking data into meaningful actions to increase the ratio of billable time, and measure the performance and accomplishments of a team.

We developed a time management tool based on SAS/IntrNet and other common web and storage technologies to provide the following features:

- A web-based application: Accessible from anywhere with a web browser, nothing to install
- A user-friendly interface
- Real-time, central data access
- Short development cycle and fully customized features
- Graphical reports for data analysis at a glance
- Real-time employee's vacation accrual
- Quick and accurate client invoicing

After a brief product overview, we will discuss the product architecture as well as key features of data collection, data analysis and data presentation. We will explain how we were able to develop a flexible time management tool while leveraging SAS technology.

3. PRODUCT OVERVIEW

TimeTrack is a time management productivity tool that helps companies better manage project time and cost during clinical trials. TimeTrack can run reports for any periods of time and provides printouts and charts to help managers analyze and summarize time spent on project activities.

- It tracks how projects are managed to help optimize processes.
- It calculates how employees spent their time to manage resource allocation or re-allocation.
- It allows managers to see at a glance team members' progress and performance, hence enabling productivity management.

TimeTrack is a web-based application developed using SAS/IntrNet. It:

- Combines the data processing capability from SAS, the indisputable leader in business intelligence, with the versatility and sophistication of web user interfaces.
- Tracks and manages time allocation in a fast and cost-effective manner using intuitive user interfaces.
- Allows multiple users to access the application simultaneously.

TimeTrack has three different types of users.

- Staff members fill-in daily timesheet with all activities for all clients. They can run reports to track their own time.
- Managers can generate detailed reports for their department and create invoice for clients.
- TimeTrack is also available to clients who can look at real-time information about resources working on their project and billable hours spent.

When users login, they can only access their own timesheet, while managers can access read-only timesheets for all team members. An automatic reminder is sent out when a user has forgotten to fill in her timesheet for one week. TimeTrack improves the effectiveness of managing time by auto-validating the input data and auto-requesting incomplete data.

TimeTrack scheme is organized in four modules as follows:

- The first module tracks allocation through data capture.
- The second module analyzes time and resource allocation. This module can be fully customized for the specific needs of a company. It is the backbone to pinpoint the need for productivity improvements.
- The third module is reporting and invoicing. It generates data in Excel or PDF formats.
- The last module is the system/user account management that allows adding or suspending user accounts and accumulating employee's vacation hours.

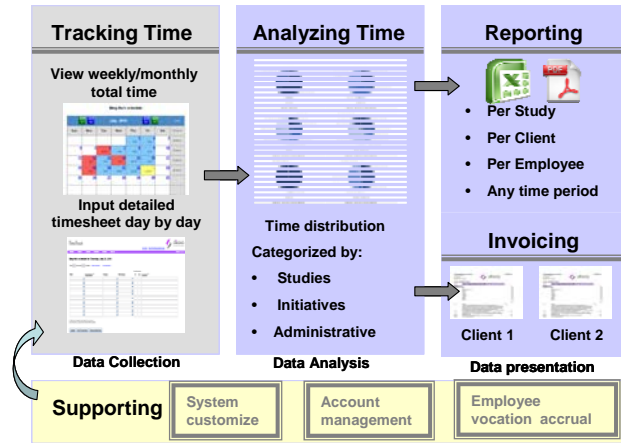


Figure 1. TimeTrack organization scheme

4. TIMETRACK ARCHITECTURE

A modular architecture is essential for the robustness of an application, including stability, maintainability, extensibility and compatibility among others.

4.1 BACK-END ARCHITECTURE

A dynamic web application is typically composed of three layers that must be installed up and properly configured: the web server, the application server and the database.

Apache HTTP server 2.2 is our web server to provide real-time reliable web service.

SAS/IntrNet was chosen as our application server to seamlessly integrate with the SAS back-end database and analysis tools. It has two components:

- The Application Broker, which is the CGI program that resides on the Web server. It interprets the information received from the web server and passes it on to the Application server.
- The Application Server, which holds the SAS session that receives input from the application broker and invokes the program component to process the requests, then returns the results to the application broker for delivery to the Web browser and the waiting user.

Depicted below is TimeTrack's product architecture.

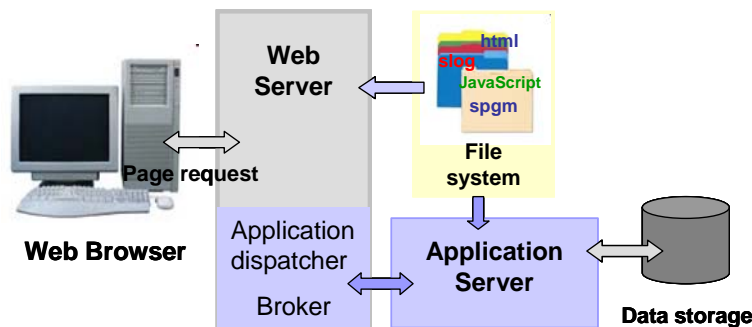


Figure 2. TimeTrack architecture

This architecture integrates SAS programming, static HTML, JavaScripts, and DHTML. We used the most popular Web application languages with SAS and most of the web application code is actually generated by SAS. As a result, product maintenance becomes much easier.

Since the web is a stateless environment, maintaining users' context for continuous communication between the web browser and the web server is an essential consideration when developing a web application. One popular way is to use cookies. An alternative solution is to use the SAS dispatcher to create and maintain a session to share data and macro variables across the different requests issued by a web browser.



A session saves all global macro variables with names beginning with SAVE_. Data sets and catalogs can also be saved across program requests using the SAVE library. Data sets and catalogs that are created in or copied to this library are available to all processes that execute in the same session. As an example, below is a macro to create a session for TimeTrack:

```
%MACRO startSession();
  %LET RC = %sysfunc(appsrv_session(create));
  %GLOBAL save_uid save_email save_authlevel save_pwd;
  %GLOBAL save_today_yyyymmdd;
  data _null_;
    call symput ('save_today_yyyymmdd', put (date(), yymmdd10.));
  run;
%MEND startSession;
```

Creating a session causes the automatic variables `_THISSESSION` and `_SESSIONID` to be set, which will be used through the session whenever browser sends a request to the application server.

4.2 FRONT-END ARCHITECTURE

The core of TimeTrack collects information from daily activities to invoice clients, analyze resource allocation, and evaluate a team's performance and productivity.

CALENDAR PAGE

The Calendar page displays a graphical representation of a monthly calendar with the daily, weekly and monthly total-hour summary. Color-coded cells indicate the daily overtime, under-time, and time-off hours entered by a user. This gives a clear view at a glance of a user's general workload for the month. Figure 3 is a screen shot of the calendar view in TimeTrack.

Joffrey Daras's schedule

March 2010							Totals
Sun	Mon	Tue	Wed	Thu	Fri	Sat	
	1 4 hr	2 10 hr	3 4 hr	4 2 hr	5 2 hr	6	140 hr
7	8 4 hr	9 10 hr	10 7 hr	11 7 hr	12 6 hr	13	22.00 hr
14	15 6 hr	16 4 hr	17 6 hr	18 6 hr	19 8 hr	20	34.00 hr
21	22 8 hr	23 8 hr	24 6 hr	25 5 hr	26 6 hr	27	30.00 hr
28	29 7 hr	30 7 hr	31 7 hr				33.00 hr
							21.00 hr

Figure 3: Calendar view

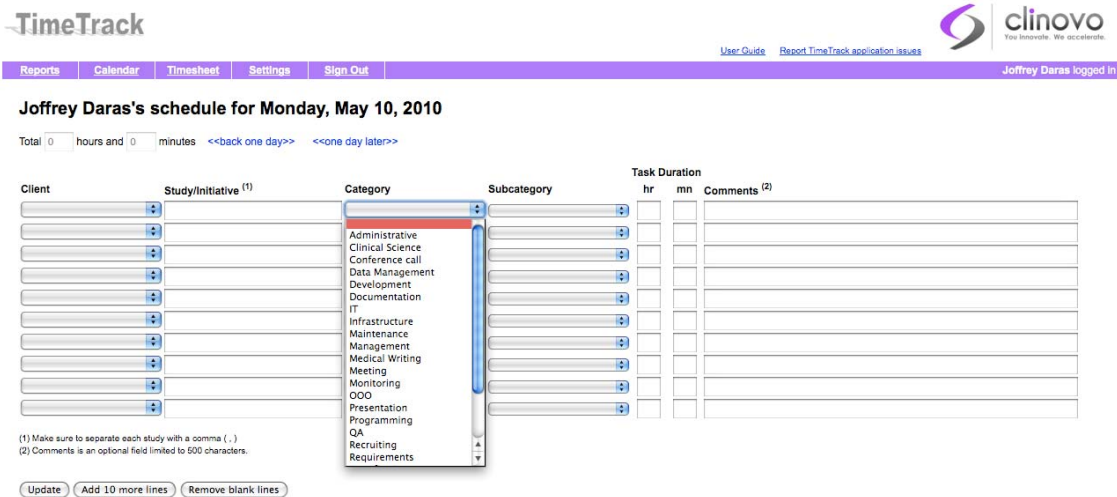
Clicking on a date hyperlink will display a daily timesheet where a user can enter her hourly activities.

TIMESHEET PAGE

This page captures the daily activities. It includes 6 areas for each activity item:

- Client area – Select a client name from a personalized drop down list.
- Study/Initiative – Select a study name, initiative or administrative. This information will be used for data analysis of hours related to specific studies , initiatives or administrative activities.
- Category – For example Requirements, Programming, Validation, etc. This information is key to pinpoint needs for process improvement.
- Subcategory – For example meetings, email, etc.
- Task duration – This contains the number of hours spent on a task.
- Comments – Free text area for more detail of the tasks

These six fields are easily customizable, as well as all related drop-down lists. The drop-downs lists are also tailored to each user as a private list of studies/Initiatives, categories. They are generated dynamically to meet unique day-to-day work categorization. When a user enters a study/initiative name that is not included in the public list or his own private list, she will be asked if she wants to add it to his private list.



TimeTrack User Guide Report TimeTrack application issues

Reports Calendar Timesheet Settings Sign Out Joffrey Daras logged in

Joffrey Daras's schedule for Monday, May 10, 2010

Total 0 hours and 0 minutes <<back one day>> <<one day later>>

Client	Study/Initiative ⁽¹⁾	Category	Subcategory	Task Duration		Comments ⁽²⁾
				hr	mn	
		Administrative				
		Clinical Science				
		Conference call				
		Data Management				
		Development				
		Documentation				
		IT				
		Infrastructure				
		Maintenance				
		Management				
		Medical Writing				
		Meeting				
		Monitoring				
		OOO				
		Presentation				
		Programming				
		QA				
		Recruiting				
		Requirements				

⁽¹⁾ Make sure to separate each study with a comma (,)
⁽²⁾ Comments is an optional field limited to 500 characters.

Update Add 10 more lines Remove blank lines

Figure 4. Timesheet view of TimeTrack

5. PRODUCT FEATURES

With just one click, managers can gain better understanding of how time is spent, as well as the performance of her team. Furthermore, since SAS is a powerful statistical analysis tool, generating statistics on time allocation over different departments, studies or activities is a very easy. Also, employees can view in real-time their work hours and personal vacation accruals.

Reports display at a glance the overall picture of how time was spent for an individual and for the team. This feature provides a powerful tool to measure productivity and take action on resource allocation or priority adjustment.

Invoicing clients is a simple operation. The client profile including invoice number, PO number, company contacts, etc., is already stored in the database. Therefore, invoices are generated dynamically, accurately and in a timely manner. Clients can access detailed and transparent reports of billable activities.

TimeTrack allows a user to retrieve real-time data from a centralized data center. Unlike traditional Excel spreadsheets, the user needn't to worry about synchronizing data from different computers with different timestamps; TimeTrack generates accurately time stamped reports from any PC with Internet access.

5.1 PRIVATE/MANAGER REPORTING

There are two types of reports provided by TimeTrack. However, new types of reports can easily be generated to meet specific needs.

- Private reporting based on individual activity information provides an overview of time distribution for any period of time. Graphical reports are displayed on the browser with easy to read pie charts. Dynamic excel spreadsheets with auto-filter option for summary reports are also easy to generate with just one click.
- Manager reporting displays the activity for all or part of the team for a given project, client and category.

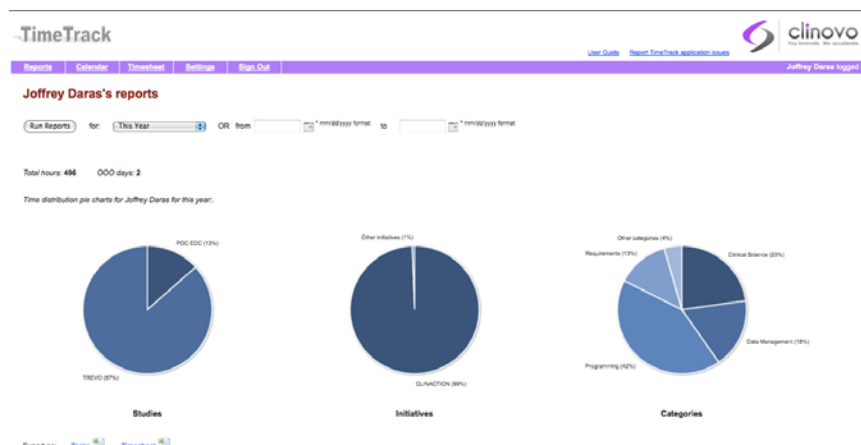


Figure 5. Screen shot of a private report

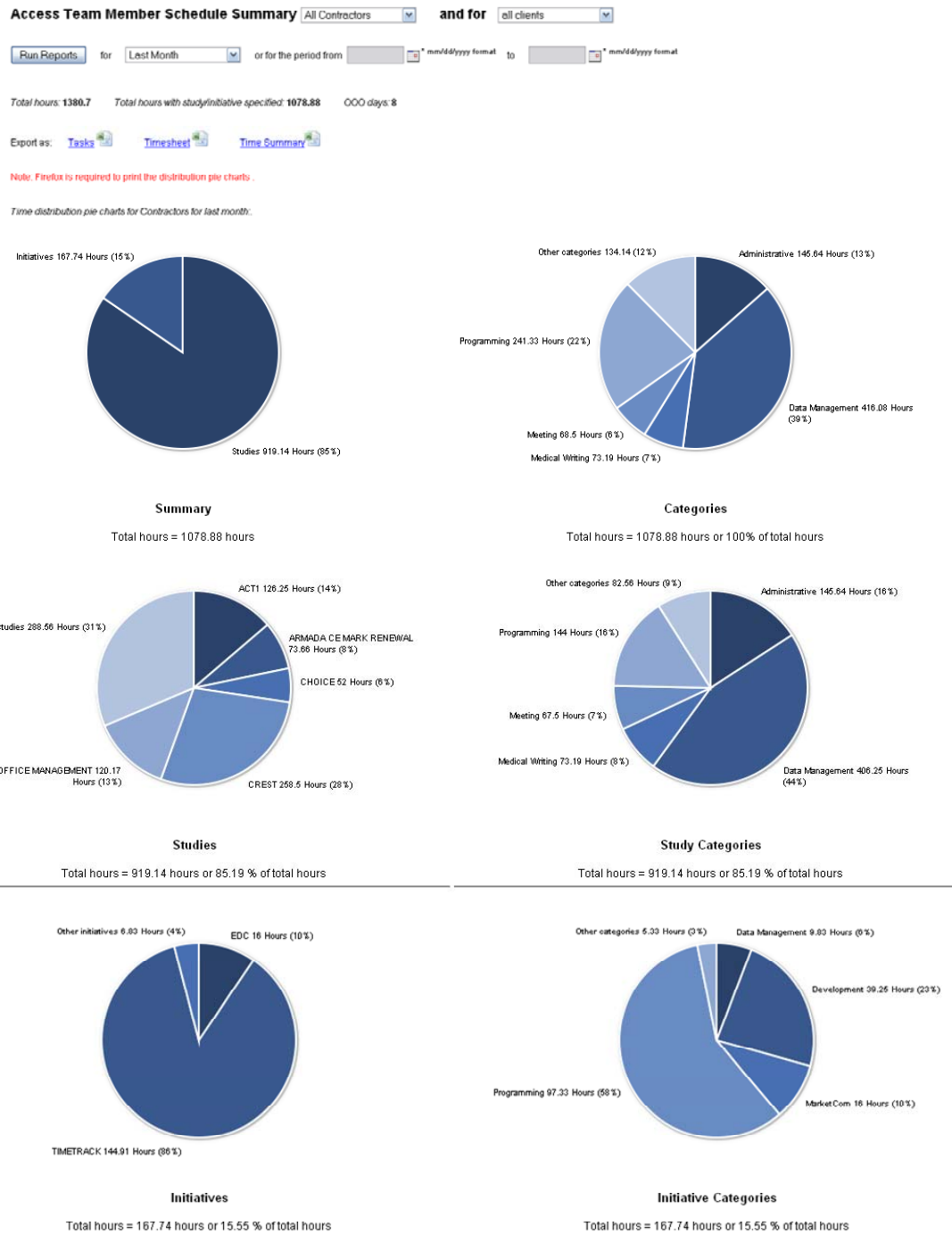


Figure 6. Screen shot for management report

By clicking on hyperlinks, you can generate three different reports in Excel format:

- Detailed daily tasks for a selected time period, selected clients and selected resources (see Figure 7).



- Summary by timesheet of an individual's detailed activity for a selected time period and client.
- Summary by study/initiative.

With SAS powerful analysis ability, even complex reports can be easily customized to meet a client's needs.

All's tasks for last month for XXXXXX

Resource Name	Date	Study & Initiative	Category	Subcategory	duration	duration	Comments
Bing Hu	07-06-2010	XXXXXX	Maintenance	Report	1	0	Weekly QC
Bing Hu	07-12-2010	XXXXXX	Maintenance	Report	1	0	Weekly check
Bing Hu	07-19-2010	XXXXXX	Maintenance	Report	1	0	weekly QC, RDE data not ready at this point
Bing Hu	07-21-2010	XXXXXX	Maintenance	Report	1	30	Data extract and check reports
Bing Hu	07-22-2010	XXXXXX	Maintenance	Report	2	30	Since resolved query Q722 appears again,
Bing Hu	07-26-2010	XXXXXX	Maintenance		1	0	Weekly QC CDM reports

Figure 7. Time report by tasks

5.2 CLIENT INVOICING

TimeTrack can quickly generate reports per project and per client with summary monthly billable hours to shorten the time and effort spent on invoicing, while improving accuracy. TimeTrack can also keep detailed records of expenses associated with specific projects.

TheBusinessBridge, Inc. dba Clinovo
 1208 E. Arques Avenue, Suite 114
 Sunnyvale, CA 94085
 Phone (800)987-6007 Fax (888)317-7517

PO#2010-01-18-01
 PO#2010-05-19-01

Invoice # XXXX20100802

Jul-10	All resources's timesheet for last month for XXXXXX	100 %
	XXXXXXXX	
Summary		100 %
Date	Activities	Hours
7/8/2010	XXXXXX/Maintenance/Report : 1hr (Weekly QC)	1
7/12/2010	XXXXXX/Maintenance/Report : 1hr (Weekly check)	1
7/19/2010	XXXXXX/Maintenance/Report : 1hr (weekly QC, RDE data not ready at this point)	1
7/21/2010	XXXXXX/Maintenance/Report : 1hr30mn (Data extract and check reports)	1.5
7/22/2010	XXXXXX/Maintenance/Report : 2hr30mn (Since resolved query Q722 appears again, rerun the report and pin point the problem)	2.5
7/26/2010	XXXXXX/Maintenance 1hr (Weekly QC CDM reports)	1
		Hours 8

Figure 8. Screen shot of the time report by timesheet day-by-day

5.3 REAL TIME VACATION ACCRUALS

Using the OOO (Out of Office) entry in the timesheet, extraction in real-time of vacation accrual information is very simple. Not only does this functionality saves time and improves vacation balance accuracy, it also enables employees to see their up-to-date vacation balance.

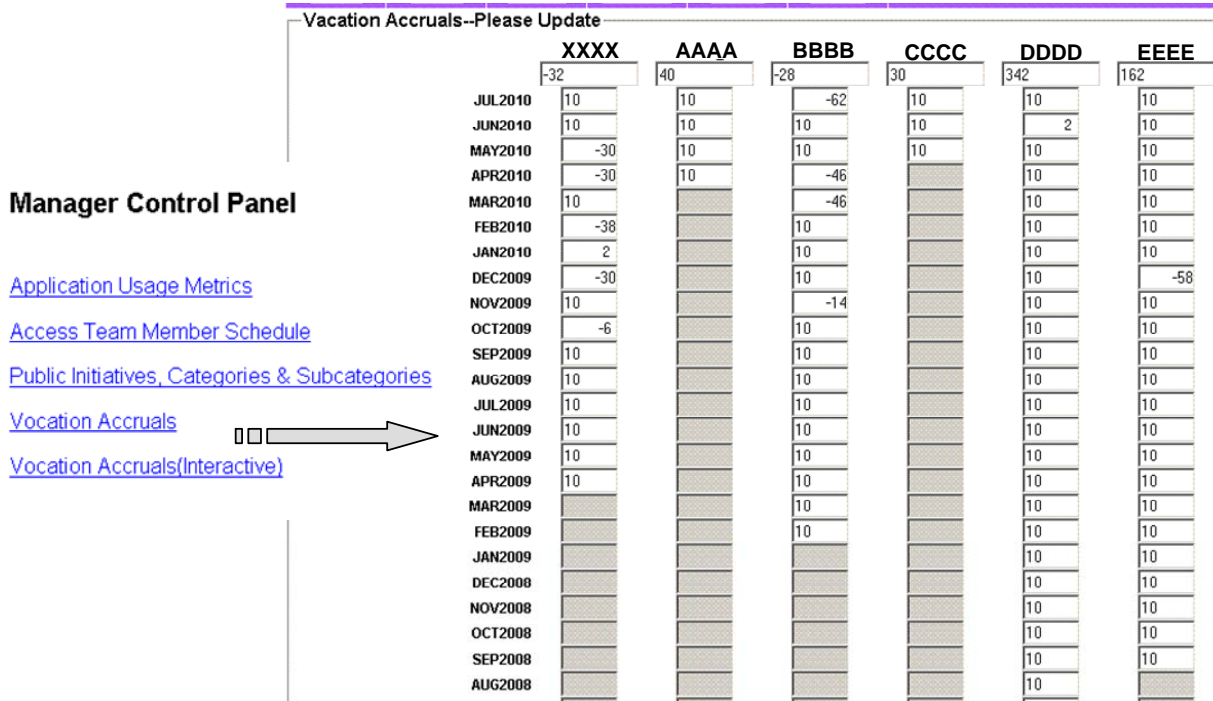


Figure 9. Summary of Employee's vacation accruals



6. BENEFITS OF THE APPLICATION

Because TimeTrack is based on SAS/IntrNet, it offers the following benefits to its users:

- It is fully customizable and easy to port to different operating systems
- It was developed very quickly and is easy to maintain
- Zero installation on the user side is required and it supports multiple concurrent users
- The centralized SAS database provides real-time data access anywhere, any time
- Meaningful reports for users and managers can be easily developed and customized.



7. CONCLUSION

TimeTrack is a light-weight tool for time-resource management that can be used as a stand-alone application or can be integrated with other project management tools such as ClinAction.

TimeTrack demonstrates ease of developing a useful web application that supports multi-users, multi-clients and multi-sites activities by leveraging the power capabilities of SAS/IntrNet.



ACKNOWLEDGMENTS

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