



WHITEPAPER

TechExcel DevTrack – Perforce Integration

Integrate Two Essential Development Tools

Introduction

DevTrack can be seamlessly integrated with your existing Perforce software providing real-time, two-way synchronization between the two systems.

Both DevTrack and Perforce are considered best of breed applications in their respective markets. Perforce specializes in Software Configuration Management (SCM) systems while TechExcel DevTrack is an issue-tracking and development management software. The combination of issue tracking and SCM software creates a single interface to the entire development lifecycle from new concept to a fully tested final product.

DevTrack/Perforce integration is developed by TechExcel and is included as part of the DevTrack Standard and Enterprise packages at no additional cost.

This paper will give a brief overview of both DevTrack and Perforce followed by an in-depth description of how to integrate the two systems. While no prior software usage experience is necessary, it is assumed the reader has a basic understanding of what issue-tracking software and SCM tools are.



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System Requirements

TechExcel, Inc.
3675 Mt. Diablo Blvd., Suite
200
Lafayette, CA 94549

Phone: (800) 439-7782
Fax: (925) 871-3992
sales@techexcel.com

*Full 30-day trials of all
TechExcel software available
for download at
<http://www.techexcel.com>*





I. Background

About DevTrack

DevTrack is the premiere defect and project-tracking tool designed specifically for software development teams. DevTrack comprehensively tracks and manages all defect information, change requests, feature enhancements, project related documents, HTML links, and other development Issues. Intuitive and powerful, DevTrack provides an integrated client/server and Intranet/Internet solution for enterprise project management. DevTrack features universal ODBC support, 100% web solution and fully featured client/server interfaces, advanced email notification, built-in time tracking, extensive customization, and presentation-quality reports and graphics.

TechExcel specializes in software defect- and project-tracking software and high-end customer relationship management (CRM) software solutions.

About Perforce

Perforce is the Fast Software Configuration Management (SCM) System geared for high performance, providing all the features of leading edge SCM systems. Built upon true client/server architecture, Perforce doesn't rely on network file access, and works quickly from initial deployment through to mature, large-scale productivity. Moreover, Perforce stores and presents information about the user's workspace in ways that streamline the user interface, making it extremely easy to use. The usability of Perforce is not at the expense of function: with atomic change transactions, flexible client views, and a powerful branching model, the Perforce system provides a comprehensive SCM environment.

Perforce is developed by Perforce Software, Inc. (<http://www.perforce.com>), a California based company.

Integration Overview

DevTrack/Perforce integration is based on the synchronization between DevTrack issues and Perforce jobs. It also allows Perforce change lists and related source file names to be synchronized to the DevTrack database. DevTrack/Perforce synchronization is designed to extend DevTrack's workflow capabilities to Perforce users.

DevTrack/Perforce auto sync service is a Windows service running constantly. It monitors the Perforce and DevTrack changes every five seconds, and performs two-way synchronizations automatically. Because such synchronization happens automatically and is performed by a Windows NT service, DevTrack/Perforce synchronization will not slow down the performance of either Perforce or DevTrack.

Synchronization rules can be set up to enable Perforce changes to be consistent with the DevTrack workflow control.

DevTrack/Perforce integration benefits include the following:

- It allows you to utilize all the features of two of the most successful development tools in the market today. By seamlessly integrating the comprehensive defect/project tracking capabilities of DevTrack with one of the most powerful version control tools available on the market today, we give our customers the best possible solution with the most affordable pricing.



- It provides for seamless integration. From DevTrack, you can view all the Perforce change list data and related files for any DevTrack defect. From within Perforce, you can see DevTrack issues as Perforce jobs. When you update any Perforce job data, the changes will be available to DevTrack seamlessly, and vice versa.
- It is maintained with a very simple and intuitive interface. DevTrack/Perforce Integration does not require the installation of any other third party modules and does not require any programming. Standard P4DTI requires some programming (or consulting service) using Python. By simple point-and-click administration, you can set up the integration environment from within DevTrack Admin in a very short period of time.
- It extends DevTrack’s powerful workflow capabilities to Perforce users.
- It offers simple creation and manipulation of reports relating DevTrack issues with Perforce changes and Perforce source file changes. Such reports can be used as product release notes, source code change logs, and changes and source code lists related to a particular build or product version.

II. Integration Basics

DevTrack/Perforce integration synchronizes DevTrack issues and Perforce jobs. It also allows Perforce changes and related source file associations to be synchronized to the DevTrack database. The following factors should be considered in designing your integration system:

- What data fields will be shared between Perforce jobs and DevTrack issues? You only want to share those fields whose value/content should be replicated. DevTrack tracks a set of properties for every issue, but for Perforce jobs, you may require a smaller set of properties.
- Define the field-level and choice-level mapping rules for synchronization from Perforce jobs to DevTrack issues, and from DevTrack issues to Perforce jobs.
- Define the default values to be used for those mapped Perforce fields when creating new Perforce jobs. A Perforce job field might be defined as “Selection” as its field type. You must provide a field value in order to create a Perforce job. Likewise, you will need to define default values for the DevTrack field when a new DevTrack issue is created from a Perforce job.
- Do you allow new Perforce jobs to be created from within Perforce? Generally, we recommend that you do not create new jobs from within Perforce. All issues should be created from within DevTrack and replicated automatically to Perforce as jobs.
- If you do want to allow Perforce jobs to be created as DevTrack issues, it is highly recommended that you designate a Perforce job property field to be linked to the DevTrack project. This enables your Perforce jobs to support multiple projects, which is a built-in feature of DevTrack.
- What kind of DevTrack issues should be replicated to Perforce? You can define the rules so that only issues with a certain progress status will be replicated from DevTrack to Perforce. Or you can enable any DevTrack issue changes to be synchronized back to Perforce, regardless of their progress states.
- What kind of Perforce jobs should be replicated to DevTrack? Most of time you will want all Perforce job changes to be replicated to DevTrack during the programming phase of the



development lifecycle. However, you may want to prevent Perforce job changes from being synchronized back to DevTrack once you are no longer in the programming phase.

There are total of 23 DevTrack fields that can be shared with Perforce in the current DevTrack/Perforce Integration implementation. In future releases, more fields may be available for sharing. In figure 1 below, notice how easily DevTrack administrators can map Perforce job fields to DevTrack issue fields.

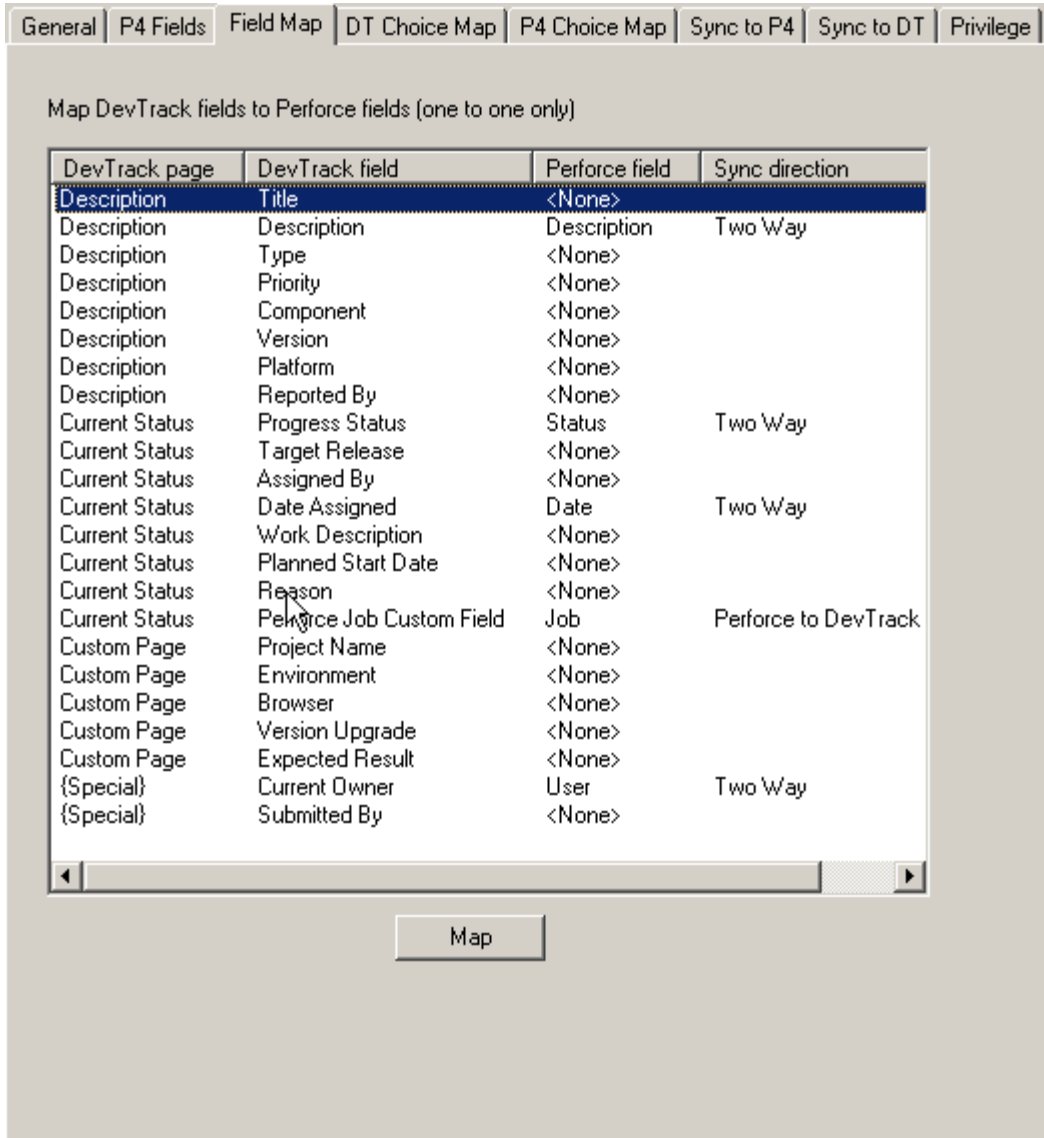


Figure 1: Mapping Perforce job fields and DevTrack issue fields using the DevTrack Admin Client

For multiple-choice fields, DevTrack/Perforce integration supports bi-directional mapping. This means that you can either use the same set of choices or a completely different set of choices. For example, if the DevTrack 'Priority' field has the available values Urgent/High/Medium/Low, the corresponding Perforce Priority field could have the same set of choices (Urgent/High/Medium/Low), or a different set of choices.



III. Extending DevTrack Workflow To Perforce

DevTrack/Perforce integration is designed and implemented to enable Perforce users to track software development issues without limiting the workflow capabilities provided within DevTrack. This is accomplished by designing the DevTrack/Perforce integration to be consistent with the DevTrack Open Workflow and Life-Cycle model (OWL). In this section, we will briefly present the DevTrack OWL model and discuss how the DevTrack/Perforce integration supports the Open Lifecycle model without limiting the flexibility and power of Perforce.

Open Workflow and Life-Cycle (OWL) Model

- You can define any number of states for your issue's lifecycle tracking. Because there is one primary owner at any phase of an issue, issue progress tracking gives you accountability, and achieves effective teamwork.
- You can represent your development team to consist of any number of groups and any number of group folders.
- By defining a proper set of account types and assigning each team member to one account type based on his/her responsibilities, you can enforce development workflow with controlled teamwork disciplines.
- By defining proper privileges to each account type, each team member's job role within a project is defined and controlled. This privilege mechanism supports the following real-world situations :
 - A programmer may only see development issues at the phases of requiring coding and unit testing.
 - The group leader for a programmers group may have the privilege to forward newly found defects to members of his/her group, but not the privilege to assign issues to members outside of his/her group.
 - A test engineer may be able to submit new issues, but may not be able to assign those issues to individual programmers. Instead the engineer may be able to assign the issues to a group folder belonging to the programmers group, '**New defect found.**'
 - A project manager can view and monitor work progress of the entire development team, assign issues to all team groups, and generate reports for a team member, team group, or the entire team.
- DevTrack tracks the entire lifecycle of any development issue. Further, DevTrack assists the current owner focus in accomplishing the work required for the current phase, and as a result, individual user development activities related to a project becomes much easier to manage.
- DevTrack's workflow model optimizes development results by providing each team member with an appropriate set of control and privileges for maximum individual work effectiveness.

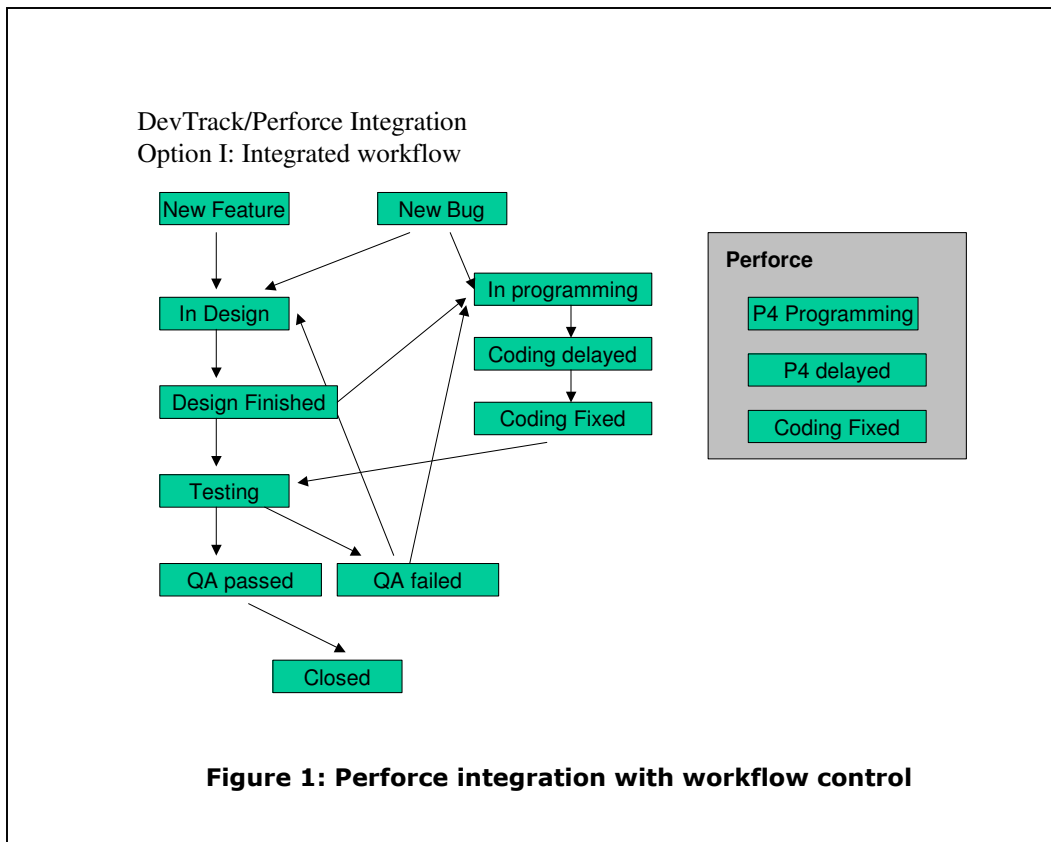


Synchronization With DevTrack Workflow

A DevTrack workflow consists of multiple progress states. Certain states may be grouped to form a phase of a DevTrack issue lifecycle. As illustrated in Figure 1, any DevTrack issue goes through three main phases: design, programming, and QA testing. Perforce and DevTrack synchronization is automated primarily for the programming phase. The synchronization is controlled as an extension of the DevTrack Workflow model.

Perforce synchronization with integrated DevTrack workflow support provides the following advantages:

- Perforce job management is represented as part of a larger software development workflow model. An issue goes through multiple phases of progress states during its lifecycle, while perforce job management corresponds to mainly the programming phase.
- Two-way synchronizations are managed primarily for the programming phase.
- DevTrack/Perforce synchronization is only performed for required phases.
- Workflow restriction can be enforced without limiting DevTrack’s workflow power. Because Perforce does not support applicable transitions or applicable owners, DevTrack would normally design the status transitions changes and the applicable owners for the programming phase with fewer rules and restrictions.
- Data synchronizations can be controlled or prevented once a DevTrack issue is no longer in the programming phase.





As illustrated in Figure 1, a DevTrack workflow model consists of multiple progress states. In this example three progress states, 'In programming', 'Coding delayed', and 'Coding fixed,' represent the programming phase of the issue lifecycle. In the programming phase it is fully synchronized with the Perforce system. Once an issue is out of the programming phase, we may want to prevent further synchronization from Perforce to DevTrack. We may also control the synchronization so that DevTrack changes are partially synchronized back to Perforce.

Synchronization Without DevTrack Workflow

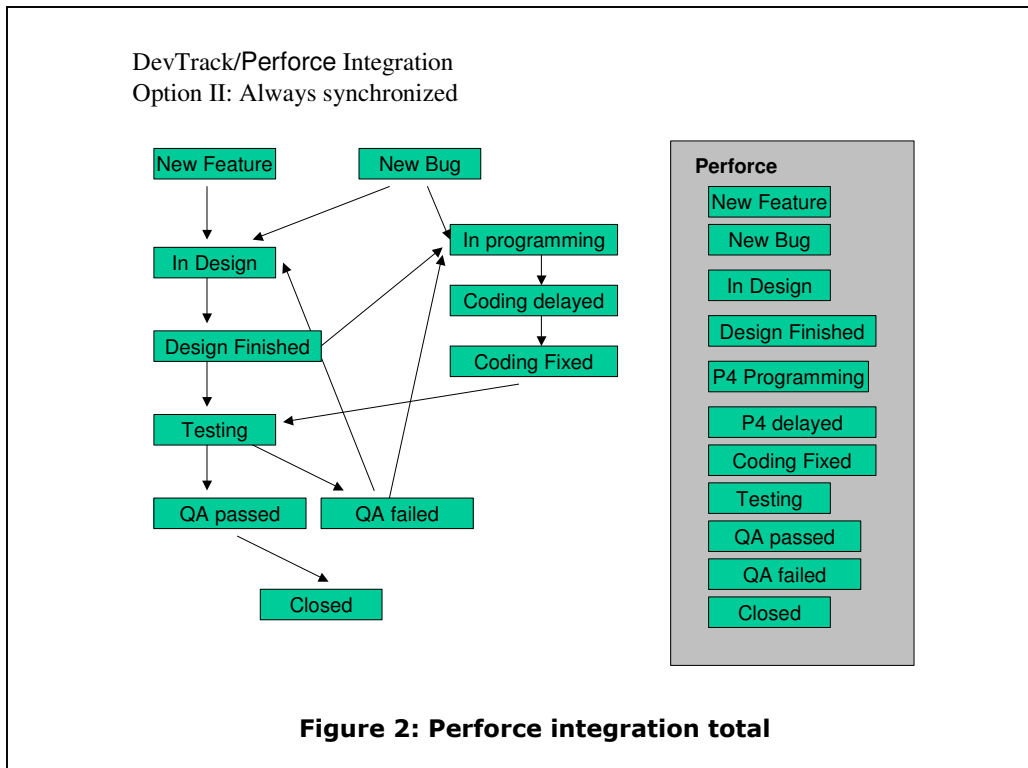
DevTrack/Perforce integration can also be configured without supporting the DevTrack workflow model (Figure 2). In this configuration, all states in the DevTrack workflow are mapped to Perforce job states. Synchronization always happens.

This model provides the following advantages:

- Much easier to enable the DevTrack/Perforce synchronization. The administrator only needs to define the one-to-one mapping.
- More information is available in Perforce. This same feature could also be viewed as a big disadvantage, since data synchronization should not be needed for the QA testing and design phases.

However this model has the following disadvantages:

- No workflow control.
- No organized information sharing.
- Slower performance.
- Cannot take full advantage of the DevTrack teamwork coordination power.





IV. Designing a DevTrack/Perforce Workflow

In this section, we will discuss how to design your DevTrack workflow to best support Perforce integration.

Design Applicable Transitions

If you enable DevTrack to support applicable next states from a current DevTrack progress state, you can define applicable transitions for any possible DevTrack state.

Unfortunately, Perforce jobs have no workflow implementation. A Perforce user can update a Perforce job by setting the job status to any state.

With the integrated DevTrack/Perforce Workflow model, we enable the synchronization from Perforce to DevTrack to be limited to only its programming phase.

This way, Perforce changes made during the programming phase will always be accepted by the DevTrack/Perforce synchronization. Perforce changes made to an issue that is no longer in the programming phase will be ignored by the DevTrack/Perforce synchronization service.

Design Applicable Owners

All changes of Perforce jobs will be accepted by the DevTrack/Perforce synchronization service if the issue in the programming phase., Because of this, it is important to design the applicable owners feature so that all Perforce users are defined as applicable owners for the programming states.

Once a Perforce user updates a Perforce job to be fixed, it is good practice to synchronize the Perforce job back to the DevTrack issue, automatically change the issue state to 'Ready for QA', and assign the current owner to be one of the QA engineers or a DevTrack QA group folder.

You can further define the email notification rules so that as soon as a Perforce user updates a job status to be fixed, the Perforce job syncs back the DevTrack issues, moves the DevTrack issue to be "Ready for QA", and automatically delivers email notifications to the proper QA engineers.

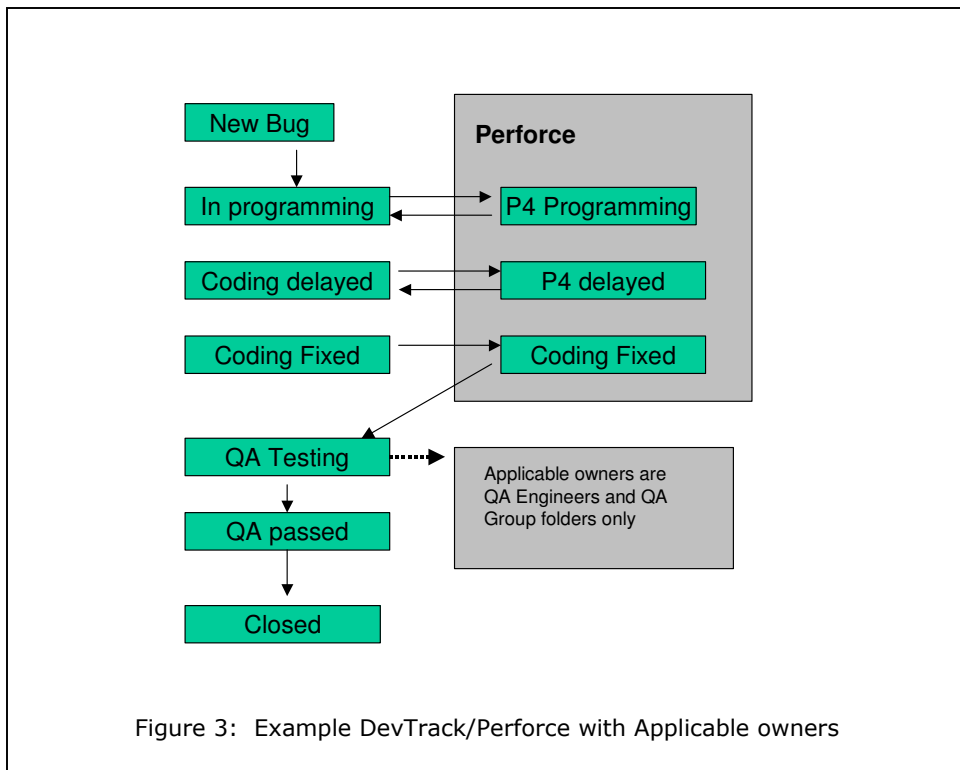


Figure 3: Example DevTrack/Perforce with Applicable owners



Figure 3 above illustrates a sample DevTrack/Perforce workflow with applicable owners enabled.

Better Workflow for Perforce and DevTrack Users

If you are running your software development projects using both DevTrack and Perforce, we recommend you design your workflow with the following considerations to achieve more effective results.

- Design your DevTrack workflow to cover your complete development issue tracking lifecycle.
- Identify the programming phase and the related states, and consider mapping these states to the Perforce job states.
- Design your mapping rules so that Perforce users can update job states and properties without violating the DevTrack workflow rules. This way all Perforce job changes will be automatically synchronized back to DevTrack.
- Identify the phases that are normally managed only in DevTrack. Such phases include all non-programming related phases. Determine if you will need to synchronize DevTrack issues to Perforce jobs for such non-programming related phases.
- Identify these non-programming progress states and define the rules that specify if Perforce job changes can be synchronized back to DevTrack issues in those progress states.

What is an optimized workflow? While there is no simple answer to this question, we want to provide you with the following considerations:

- Perforce job states should be related to the programming phase only. Usually only a small number of Perforce job states are needed, and their mapping to DevTrack states are mainly one to one relationships.
- When a Perforce user updates a job state to be programming fixed, it normally will synchronize the progress status to a DevTrack issue and trigger an ownership change. The issue will be assigned to a new owner, typically a QA folder or a default QA testing team member.
- You will need to decide if changes to issues outside of the programming phase will be synchronized from DevTrack to Perforce.

To summarize, design your DevTrack workflow to cover the needs of both DevTrack users and Perforce users. An effective workflow model satisfies your project needs, seamlessly integrating DevTrack and Perforce with optimum teamwork results.

V. Reporting

DevTrack has enhanced its reporting capabilities related to Perforce synchronization. There are three reports available from the DevTrack Web.

- Brief report shows all of the DevTrack issues properties and the related Perforce changes.
- Concise report shows all of the DevTrack issues and the linked Perforce changes, as well as all the related Perforce jobs related to each Perforce change.



- Detailed report shows all of the DevTrack issues and the linked Perforce changes, related Perforce jobs, and related Perforce source file links.

Perforce Report By Issue ID									
(Brief)									
Records: 1 - 30 Total: 30									
Issue ID	Title	Type	Progress Status	Change	Change Description	Change Date	Change User	Change Status	
70	Install new file server	MI (Minor Improvement)	Fixed	12	Change some source code, all closed	2001/12/09 12:02:11	administrator@tznt		
				10	Terry-s, I have fixed a problem, on Dev 64, Make it open, fixed again, Close it, and status change to close	2001/12/04 14:33:17	terry-j@tznt		
64	Web-based file uploading and downloading.	FE (Future Enhancement)	Fixed	12	Change some source code, all closed	2001/12/09 12:02:11	administrator@tznt		
				10	Terry-s, I have fixed a problem, on Dev 64, Make it open, fixed again, Close it, and status change to close	2001/12/04 14:33:17	terry-j@tznt		
				6	Checked in	2001/06/11 22:58:00	administrator@tznt		
63	Total Customization?	FE (Future Enhancement)	In Progress	12	Change some source code, all closed	2001/12/09 12:02:11	administrator@tznt		
62	Time Tracking and Quality-Index reporting	CR (Change Request)	Fixed	25	New chagne list, closed	2001/12/09 13:56:14	administrator@tznt		
				24	New change list, sdfkjlksjfdsfdfs	2001/12/09 13:47:54	administrator@tznt		
				20	New change list, new, making the	2001/12/09	administrator@tznt		

Total of 30 Issue(s) Selected.

Figure 4: Perforce Report listing open DevTrack Issues and Perforce change lists related to the issue

Figure 4 above shows a sample brief web report displaying DevTrack issues and Perforce changelists associated with the issue. For example, DevTrack Issue ID 70 has two perforce jobs associated with it: 12 and 10. Also notice that perforce changes 10 and 12 also are associated with DevTrack issue 64. Often, a single code change will correct multiple issues and this report can show which changes are related to multiple DevTrack issues.

VI. Other SCM Integration Options

Microsoft Visual Source Safe

DevTrack provides seamless integration with Microsoft's Visual SourceSafe version control software, allowing users to automatically associate an Issue in DevTrack with the check in/check out operations of Visual SourceSafe, providing a tight link between version control and defect management.

With DevTrack source code control (SCC) add-in module, you can select related DevTrack Issues directly from within Visual SourceSafe or other software development platforms such as Visual Studio and Visual C++, while you perform check-in/check-out operations. This means you can stay within your IDE without launching DevTrack.

DevTrack/AccuRev Integration

DevTrack/AccuRev Integration links DevTrack issues with AccuRev change packages or dispatch issues and enables DevTrack and AccuRev to work together seamlessly to deliver a more complete software development solution.



Other Version Control Systems

DevTrack also supports integrations with Rational ClearCase, Merant PVCS, BitKeeper and the popular open-source Concurrent Version System (CVS).

Summary

The DevTrack/Perforce integration improves the development process by providing a unified system for development teams. DevTrack tracking and workflow combined with Perforce SCM creates a connected development environment that is fast and easy-to-use. Project managers, developers and QA engineers will all benefit from project reporting capabilities and automated email notification features.

Both DevTrack and Perforce separately offer a robust, user-friendly feature set to their users. With DevTrack/Perforce integration, these two systems can be connected to provide end users with an intuitive, comprehensive interface to utilize the power of both development applications.



DevTrack System Requirements

Windows Client: Windows NT4.0, XP or 2000, PC with 128MB memory and 100MB free hard disk space.

Web Client: Any computer with MS IE 5.0 and above or Netscape 6.0 and above.

Server: Windows Server NT, Windows 2000 Server, Windows 2003 Server with 256MB memory and 500MB of free hard disk space, Microsoft Internet Information Server 4.0 and above.

Database: MS SQL Server, Oracle 9 and above, MySQL, InterSystems Cache, MS Access

Contact Information

TechExcel Inc.

3675 Mt. Diablo Blvd, Suite 200

Lafayette, CA
94549

Sales and Inquiries

Toll Free: (800) 439-7782

Phone: (800) 439-7782 ext. 5

Email: sales@techexcel.com

More Information

Find out more at the TechExcel DevTrack homepage. You can download white papers, try the online demo or download a full 30-day evaluation.

<http://www.techexcel.com/products/devtrack.html>

Please see the Perforce website for contact, pricing and system requirements information:

<http://www.perforce.com>