2.0 Contents

Visual Studio 2005 Team System Overview 4

Visual Studio 2005 Team System Client Products 4

  Basic Licensing Model 5
  Team Foundation Server CAL 5
  Downgrade Rights 6
  User Acceptance Testing 6
  Software Assurance and MSDN Subscriptions 6
  Evaluating Client Products 6
  Typical Deployment Scenarios 7

Visual Studio 2005 Team Foundation Server 7

  Basic Licensing Model 7
  Accessing Team Foundation Server 8
  Team Foundation Server CAL Requirements 8
  Windows Server 2003 and Team Foundation Server 8
  Using Team Foundation Build 9
  Accessing Team Foundation Server Project Data 10
  Scaling-Out with Team Foundation Server 10
  Using SQL Server 2005 Standard Edition 13
  Team Foundation Server Workgroup Edition 13

Visual Studio 2005 Team Test Load Agent 13

Team System Deployment Scenarios 14

Additional Software Licensing Requirements 14

Summary 15
Visual Studio 2005 Team System Overview

Microsoft® Visual Studio® 2005 Team System expands the Visual Studio product line to include a new set of software development life-cycle (SDLC) tools. Team System includes individual products for software architects, software developers, and software testers, a server for version control, work item tracking, build automation, and project tracking as well as products for generating additional load testing load. Project managers, business analysts, operations managers, and other roles in the software development life cycle can also benefit from Team System by using Team Explorer.

Team System was designed and built to provide an integrated approach to solving software development challenges. Through deep integration of Team System features, organizations are able to communicate and collaborate more effectively throughout the process of designing, building, testing, and deploying software. Software teams that deploy Team System products as an integrated system typically see the most significant benefits in terms of increased communication between team members, manageability of products, and increased efficiency.


This white paper provides customers and partners with a brief introduction to the products, an overview of the licensing model, and common deployment scenarios.

For basic pricing information on the products described in this white paper, please visit: http://msdn.microsoft.com/howtobuy/vs2005/editions/team/.

Visual Studio 2005 Team System Client Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Team Suite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Scenarios</td>
<td>Visually designing service-oriented applications</td>
</tr>
<tr>
<td>Key Functionality</td>
<td>Application Designer</td>
</tr>
<tr>
<td></td>
<td>Logical Datacenter Designer</td>
</tr>
<tr>
<td></td>
<td>Deployment Designer</td>
</tr>
<tr>
<td></td>
<td>System Designer</td>
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<td></td>
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</tr>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Functionality</td>
<td>Microsoft® Visual Studio® 2005 Professional Edition</td>
</tr>
<tr>
<td></td>
<td>Microsoft® Visual Studio® 2005 Team Foundation Server CAL</td>
</tr>
</tbody>
</table>

**Table 1. Overview of Team System Client Products**

For more detailed technical and feature information on the Visual Studio Team System product line, please visit: [http://msdn.microsoft.com/teamsystem/](http://msdn.microsoft.com/teamsystem/).

**Basic Licensing Model**

In general, the Team System client products are licensed on a per user basis and each licensed user may install the software as many times as they wish on their devices. However, a license for each product is required for each user who installs and/or uses it. Through Microsoft Volume Licensing, each of the Team System client products can be licensed as a standalone product, or with an MSDN Premium Subscription. At retail, Team System client products are only available with MSDN Premium Subscriptions.

When purchased with an MSDN Premium Subscription, each of the Team System client products (including Team Suite) contains developer tools, as well as server and operating system products. Use of these server and operating system products is limited to designing, developing, testing, and demonstrating your applications; production use of these products is not permitted.

**Team Foundation Server CAL**

Each of the Team System client products has been designed to integrate seamlessly with Team Foundation Server. Team Foundation Server provides version control, build automation, work item tracking, and other functionality for the development process; these services can be accessed from the Team Explorer components that integrate with the Team System client products, or as a standalone client. Each licensed Team System client user also receives a CAL (Client Access License) for Team Foundation Server. Additional CALs
may be purchased for users who are not licensed for the client products. More information on Team Foundation Server and CALs can be found in the Team Foundation Server section.

**Downgrade Rights**

Purchasing a Team System client product entitles the user rights for any previous version of the product; therefore, because this is the first version of Team System, this entitles licensed users to use either Microsoft® Visual Studio®.NET 2003 Enterprise Architect or Microsoft® Visual Studio®.NET 2003 Enterprise Developer, as well as their predecessor products.

**User Acceptance Testing**

Organizations that build software using Team System typically look for users to “acceptance test” applications before they are deployed to ensure the application meets both the specifications and needs of users. An exception is provided for this scenario; non-licensed users may access the operating system and server software solely for the purpose of user acceptance testing.

**Software Assurance and MSDN Subscriptions**

Software Assurance is an expanded maintenance program that provides a broad range of benefits that help organizations maximize the value of Microsoft technology. They help minimize customer licensing costs and increase business productivity. MSDN subscriptions are the Software Assurance (SA) offering for Team System client products. With an MSDN Premium Subscription, customers will also receive the rights to the next released version of their Team System client product if the new version was released during the term of their SA coverage. For more information, see the Volume Licensing Home Page (http://www.microsoft.com/licensing).

Subscribers also receive the right to install Microsoft Office Professional Edition 2003 on one system for production purposes, in addition to one copy of Microsoft® Office InfoPath® 2003, Microsoft® Office OneNote® 2003, Microsoft® Office Visio® Standard 2003, Microsoft® Office Project 2003, and Microsoft® Office FrontPage® 2003 on one device for general purposes related to the design, development, testing, and demonstration of the applications they create. Users receive a broader set of server and operating system products for design, development, test, and demonstration purposes, as well as the same rights to new versions of those products during the term of their subscription. If you wish to have access to the entire Microsoft platform for design, development, and test purposes, you should purchase an MSDN subscription with your Team System product.

Finally, each MSDN Premium Subscription purchased with a Team System client product will also include Microsoft® Visual Studio® 2005 Team Foundation Server Workgroup Edition. Unlike the other server products included with MSDN Premium subscriptions, production use rights are granted with this product. More information on this edition is available below.

**Evaluating Client Products**

MSDN Universal and Enterprise subscribers will receive a no-cost transition to a Team System client product at launch. MSDN Universal subscribers may choose from Team Edition for Architects, Team Edition for Developers, and Team Edition for Testers; Enterprise subscribers are entitled to Team Edition for Developers. For more information regarding the MSDN subscriber transition plan, see MSDN Subscriptions (http://msdn.microsoft.com/subscriptions).
Microsoft Volume License customers who do not have an MSDN subscription may evaluate Team System client products in two ways. A 180-day trial of Team Suite is available; in addition, any Microsoft Volume Licensing customer can install and evaluate any of the Team System client products for 60-days before requiring a license.

**Typical Deployment Scenarios**

Deployment scenarios for Team System client products differ depending on the structure of the development team. Some development processes are highly defined with limited roles and clear delineation. Other development teams may have less delineated roles with individuals playing multiple roles. As mentioned above, each client product supports the core code writing scenarios; however each product also contains specialized tools that may be more or less relevant to members of your development organization. Organizations may not rotate client products among users; should the development process require a user to have the full set of Team System client tools, Team Suite is available.

<table>
<thead>
<tr>
<th>Team Structure Staffing</th>
<th>Recommended Licensing Configuration</th>
</tr>
</thead>
</table>
| Clearly delineated roles: one architect, two developers, and one tester | 1 copy of Team Edition for Software Architects  
2 copy of Team Edition for Software Developers  
1 copy of Team Edition for Software Testers |
| Non-delineated roles: four team members involved in all aspects of design, development and test | 4 copies of Team Suite |

Table 2. Example Licensing Configurations

**Visual Studio 2005 Team Foundation Server**

Microsoft® Visual Studio® 2005 Team Foundation Server is the backbone of Team System. Team Foundation Server provides a number of core services, including version control, work item tracking, reporting, and automated team-wide builds. Team Foundation also provides a number of critical innovations to solve core problems in team development scenarios, such as complete integration between the client products and the server to facilitate collaboration, flexible process configuration to impose predictability, and detailed, metric-based reporting for insight into the development process.

For detailed technical and feature information on Visual Studio 2005 Team Foundation Server, see Team Foundation Server [here](http://lab.msdn.microsoft.com/teamsystem/teamcenters/team).

Team Foundation Server uses Microsoft® SQL Server™ 2005 as its data repository. A restricted-use version of Microsoft® SQL Server™ Standard Edition is included with Team Foundation Server, which is installed separately. More information regarding SQL Server is available below. Team Foundation Server is also available in the Workgroup Edition. Microsoft® Visual Studio® 2005 Team Foundation Server Workgroup Edition contains all of the same features as Team Foundation Server but its use is constrained to five (5) user accounts.

**Basic Licensing Model**

Team Foundation Server is licensed under a common, Server/CAL Microsoft licensing model. This simply means that a license must be purchased for each computer Team Foundation
Server is installed on, and each user or device that accesses Team Foundation Server must have a CAL (Client Access License). Organizations may choose to purchase user CALs, device CALs, or a combination of both. User CALs are typically used when one user may be accessing Team Foundation Server from multiple devices or locations; device CALs are typically used when multiple individuals share a device to access the server.

You do not need a Team Foundation Server CAL for:

1. Any device running another licensed copy of the server software.
2. Up to two devices or users that only access the server software to administer it.

**Accessing Team Foundation Server**

Team Foundation Server is accessed through Team Explorer. You may install Team Explorer on as many physical devices as you like; however, it can only be used with Team Foundation Server.

Additional aspects of Team Foundation Server licensing:

- You may buy an external connector license to allow any number of external users to access and use one of your licensed copies of the server software. “External users” refers to users that are neither (i) your or your affiliates’ employees, nor (ii) your or your affiliates’ on site contractors or agents.
- You may reassign Team Foundation Server CALs as needed within your organization, even those that come with Team System client products.
- Your Team Foundation Server CALs provide you access to earlier versions of the software but not later versions; to access later versions of Team Foundation Server you must buy new licenses, or Software Assurance.
- Hardware or software that reduces the number of devices or users that directly access the server software (sometimes referred to as “multiplexing” or “pooling”) does not reduce the number of CALs you need.

**Team Foundation Server CAL Requirements**

A CAL is required for users or devices which:

- Directly access Team Foundation Server or SQL Server 2005.
- Indirectly query or write to Visual Studio 2005 Team Foundation Server or SQL Server 2005 through another software application or device.

A CAL is not required for users who:

- View static Team Foundation Server data that has been manually distributed outside of the server software.
- Receive Team Foundation Server reports through e-mail and do not indirectly access the server to refresh, create, or update data.
- Receive printed Team Foundation Server reports.

For more information, or if you have questions, please consult the Product Use Rights document on the Volume Licensing Resources site (http://www.microsoft.com/licensing/resources/downloads/default.mspx).

**Windows Server 2003 and Team Foundation Server**

The use of Team Foundation Server requires a license of Microsoft® Windows® Server 2003 for each physical device on which the software will run. The use of the development and test editions of Windows Server 2003 provided with MSDN subscriptions is not permitted. If
Windows Server 2003 is licensed on a Server/CAL basis, each licensed Team Foundation user also requires a Windows Server 2003 CAL.

**Using Team Foundation Build**

The build automation functionality in Team Foundation enables automating builds from the physical device hosting Team Foundation Server onto one or more other separate physical devices. A build typically assembles the component pieces of software together along with any prerequisites and compiles them into an application. The automated build process in Team Foundation also includes the ability to run quality or performance tests as part of the build process.

All users accessing Team Foundation Server as part of the build process – whether to script the steps in the build, set up the quality or performance tests, or even schedule or start the build – will each require a CAL. As the build commences, the physical device will gather the relevant source code as well as required redistributables or compilers, and place them on another physical device.

It is important to note here that while there will be server-to-server communication between Team Foundation Server and the device hosting Team Foundation Build, no CAL is required for that device as part of the build process as long as the users managing the build process have CAL’s.

In addition, Team Foundation Build is considered “additional software” and may be freely redistributed onto build servers without requiring any additional Team Foundation Server licenses for that build server.

As part of the build process, Team Foundation Server may run quality tests and/or analysis on the precompiled or compiled code. These tests rely on functionality found within Team System client products, typically within the Team Edition for Software Developers or Team Edition for Software Testers products. These products may be installed on the build machine by licensed users of those products, as long as they are not directly used by any individuals who are not licensed for those products. Team Foundation Server will gather results of the build as well as any quality tests or analysis and deposit them in the Team Foundation Server data repository.

<table>
<thead>
<tr>
<th>Team Member Actions</th>
<th>Licensing Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developer checks-in source code.</td>
<td>Team Foundation Server CAL required.</td>
</tr>
<tr>
<td>Developer scripts a build to include any of:</td>
<td>Team Edition for Developers required.</td>
</tr>
<tr>
<td>• Unit Testing</td>
<td></td>
</tr>
<tr>
<td>• Code Coverage</td>
<td></td>
</tr>
<tr>
<td>• Code Analysis</td>
<td></td>
</tr>
<tr>
<td>Tester scripts a build to include any of:</td>
<td>Team Edition for Testers required.</td>
</tr>
<tr>
<td>• Generic Testing</td>
<td></td>
</tr>
<tr>
<td>• Web Testing</td>
<td></td>
</tr>
<tr>
<td>• Load Testing</td>
<td></td>
</tr>
<tr>
<td>• Manual Testing</td>
<td></td>
</tr>
<tr>
<td>Project manager scripts, or initiates a build.</td>
<td>Team Foundation Server CAL required.</td>
</tr>
</tbody>
</table>

**Table 3. Scenario – Team Foundation Build Licensing Implications**
Accessing Team Foundation Server Project Data

Team Foundation Server assembles all project data generated through work items, quality tests, and other processes in a single data repository. Having the ability to see multi-dimensional views of your projects across a timescale helps team members, development managers, and IT decision makers to understand progress across a number of dimensions, make better decisions during projects, and better predict outcomes. Project data is stored within Team Foundation Server’s data repository in SQL Server and is accessible in a number of ways. As a generalization, accessing data directly from Team Foundation Server requires the user to either have a user CAL or a CAL for the device from which the data is accessed.

<table>
<thead>
<tr>
<th>Access Scenario</th>
<th>Required Additional Software</th>
<th>Licensing Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viewing manually distributed reports via Microsoft® Windows SharePoint Services.</td>
<td>Microsoft Windows Server 2003 Standard Edition, or higher.</td>
<td>A Team Foundation Server CAL is not required; appropriate Windows Server licenses are required.</td>
</tr>
<tr>
<td>Viewing and managing work items with Microsoft Office Project 2003.</td>
<td>Microsoft Office Project Professional 2003</td>
<td>Users querying Team Foundation Server or SQL Server, or inputting data, must have a Team Foundation Server CAL. Users simply viewing the data within a file that has been sent through e-mail, printed or otherwise manually distributed do not need a Team Foundation Server CAL.</td>
</tr>
<tr>
<td>Viewing reports with SQL Server 2005 Reporting Services.</td>
<td>None</td>
<td>A Team Foundation Server CAL is required.</td>
</tr>
</tbody>
</table>

Table 4. Scenario – Accessing Team Foundation Server Project Data

Scaling-Out with Team Foundation Server

Organizations can use Team Foundation Server across their development organizations by leveraging the inherent scalability of the system. The system has been designed to support up to 500 users and still maintain high performance.

Generally, there are two benefits with replication – performance and reliability. Clients can connect to the ‘closest’ server to achieve better performance. And, if any server goes down, another one can take its place.

Team Foundation Server takes a different approach, but still addresses the main benefits of replication – performance and reliability. Team Foundation Server can do this because it is designed to leverage existing technologies like Internet Information Services 6.0 (IIS) and SQL Server 2005.
To support its high-traffic Web site scenarios, IIS lends itself very well to caching. Local copies of a given request are kept; these local copies increase performance because network traffic is avoided. Team Foundation Server leverages this approach for its own traffic. A local copy of software assets are kept and refreshed out of band. Only the changes to these assets incur network traffic; all other operations are serviced by the local cache. This dramatically increases the performance of the system.

To support its mission-critical scenarios, SQL Server 2005 databases support clustering. All of the software assets that Team Foundation Server manages are stored in a single SQL Server 2005 instance, so it can leverage this clustering to provide reliability.

Caching and clustering allow Team Foundation Server to support the ‘scale-out’ scenario. Each approach is explained in detail below.

**Caching Proxy**

To maximize scalability, organizations can take advantage of the Team Foundation Server Proxy to optimize their interaction with Team Foundation Server.

This proxy is ideal of geographically distributed teams. Typically each team within a larger, geographically distributed team would install a Team Foundation Server Proxy at their location. This ensures that network requests are made only when absolutely necessary and most requests are served from the local cache (see Figure 1). This dramatically reduces the amount of requests made to the actual Team Foundation Server, which allows it to serve a high number of users with no degradation in performance.

![Figure 1. Caching Proxy](image-url)
Team Foundation Server Proxy is licensed on a per-device basis. A full Team Foundation Server license is required for installation; however, additional Team Foundation Server CALs are not required.

**Clustering**

Organizations can increase the availability of their Team Foundation Server by using clustering. SQL Server 2005 supports clustering in the Standard Edition or higher. Clustering provides high availability by combining several physical SQL Server instances into one virtual one. When used with Team Foundation Server, this requires the physically separate application and data tiers, with the data tier hosted on two or more physical servers. Clustering in SQL Server 2005 makes these separate servers appear as one virtual instance (see Figure 2).

**Figure 2. Clustering**

An additional Team Foundation Server license is required for each clustered instance; however, additional Team Foundation Server CALs are not required.
Using SQL Server 2005 Standard Edition

As mentioned earlier, SQL Server 2005 provides the sole data repository for Team Foundation Server. A restricted-use license of Microsoft SQL Server 2005 Standard Edition is provided under the following terms:

- You may only use the SQL Server software with Visual Studio Team Foundation Server; you may not use it for any other purpose.
- You may only install SQL Server on one physical device per Visual Studio Team Foundation Server license.

Team Foundation Server Workgroup Edition

Team Foundation Server is also available in a workgroup edition, which is limited to five users. Team Foundation Server Workgroup Edition has identical functionality to Team Foundation Server with the exception of the limitation on the number of users. Team Foundation Server Workgroup Edition is provided with Team System client products that are licensed with MSDN Premium Subscriptions. In addition, Team Foundation Server CALs are not required for accessing Team Foundation Server Workgroup Edition.

Visual Studio 2005 Team Test Load Agent

Microsoft® Visual Studio® 2005 Team Edition for Software Testers provides a number of functions to assist software professionals to ensure the quality of their applications. One of these is the ability to load test applications to understand their performance and scalability properties. Team Edition for Software Testers includes the ability to manage test cases, perform manual testing, and perform load testing from a single machine. Under the licensing terms of Team Edition for Software Testers, licensed users may install the software on any number of machines, however Team Edition for Software Testers does not include the ability to “harness” multiple physical devices to generate additional load; load generation scenarios are limited by the hardware. Typically, for the recommended software configurations, this is approximately 1,000 virtual users (the number of virtual users that can be simulated is also heavily dependent on the actual tests being run).

Microsoft® Visual Studio® 2005 Team Test Load Agent, which includes both agent and controller software, is for creating additional, synchronized load. Team Test Load Agent enables users to scale-out test load by adding more physical devices, each with the agent software installed, and synchronized by the controller software. Team Test Load Agent is licensed per processor; users must acquire a license for each processor on which Team Test Load Agent runs, regardless of the number of cores those processors have. In addition, Team Test Load Agent requires Team Edition for Software Testers to generate synchronized load and report test results.

Using the recommended hardware configuration for Team Test Load Agent, example load generation scenarios are shown in Table 5 (note that load is typically measured in concurrent virtual users).

<table>
<thead>
<tr>
<th>Test Load Required</th>
<th>Team Edition for Testers</th>
<th>Team Test Load Agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000 Virtual Users (VU)</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>5,000 VU</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>10,000 VU</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>25,000 VU</td>
<td>1</td>
<td>25</td>
</tr>
</tbody>
</table>
Table 5. Typical Load Generation Scenarios

Team System Deployment Scenarios

Team System is designed to support a wide range of deployment scenarios. Teams may choose to deploy Team System across their entire development team, or in conjunction with other tools. Team System allows organizations to choose which aspects to deploy with simple, snap-to licensing terms. Table 6 contains a sample number of scenarios and the Team System licensing implications.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Licensing Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full deployment with each team member using a Team System client product and Team Foundation Server.</td>
<td>Each team member will receive a CAL (Client Access License) with Team System Client products, no additional CALs are needed. One Team Foundation Server license is required for each server deployed.</td>
</tr>
<tr>
<td>Use of Team Foundation Server without Team System client products or with non-Microsoft tools.</td>
<td>One license is required for each server on which Team Foundation Server is deployed. One Team Foundation Server CAL is required for each user or device accessing Team Foundation Server; CALs can be purchased separately or with client products.</td>
</tr>
<tr>
<td>Distributed teams, or off-site development with partners.</td>
<td>One license is required for each server on which Team Foundation Server is deployed, regardless of location. Licensee may buy an external connector, allowing unlimited off-site access to Team Foundation Server by non-employees for a fixed price.</td>
</tr>
<tr>
<td>A multi-server deployment of Team Foundation Server.</td>
<td>One license is required for each server on which Team Foundation Server is deployed, including when the application and data tiers are on separate servers. A passive failover (warm stand-by) server requires a separate Team Foundation Server license.</td>
</tr>
</tbody>
</table>

Table 6. Deployment Scenario Team System Licensing Implications

Additional Software Licensing Requirements

As noted throughout this white paper, you will need additional software licenses to support a Team System deployment. For more information on Team System software requirements, see the Visual Studio 2005 Team Foundation Installation Guide (http://go.microsoft.com/fwlink/?linkid=40042).
Summary

Organizations will implement Team System in different ways. The licensing terms and provisions outlined in this paper ensure flexibility in deployment for all sizes of teams. Prior to making decisions regarding Team System licensing, you should first identify the needs of your team. For example:

- Do team members perform specific, delineated tasks, or do some perform multiple tasks from design through development and test? For team members who perform multiple tasks, you should acquire Team Suite.

- Will all team members require a Team System client product? If not, you should acquire separate Team Foundation Server CAL for each user who will access Team Foundation Server, but will not be licensed for a Team System client product.

- Is your team geographically distributed? Or, will you plan to outsource some development work to an off-site team? If so, you should consider purchasing additional Team Foundation Server licenses for using Team Foundation Server Proxy at remote locations.

- How much load will you need to generate in your testing? If you require more than approximately 1,000 virtual users, you should consider using Team Test Load Agent to increase load testing capacity.

3.0 Related Links


For more information about your MSDN subscription and transitioning to Visual Studio 2005 Team System, see the MSDN Subscriptions Web site (http://msdn.microsoft.com/subscriptions).