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The Microsoft Application Platform and SharePoint

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An *application platform* is the foundation upon which developers build the software that people use from day to day. After an introduction to SharePoint, this chapter takes a look at application platforms, with particular attention to the Microsoft Application Platform. Finally, the starring roles of Windows SharePoint Services 3.0 and Microsoft Office SharePoint Server 2007 are explained in a way that may change the way you think about enterprise applications.

SharePoint Products and Technologies

SharePoint is a set of products and technologies with informative and collaborative web-based capabilities that help people create, organize, distribute, and maintain stored knowledge. SharePoint web sites and pages are commonly used to build intranet and extranet portals and team sites, as well as public-facing Internet sites. SharePoint is a great platform upon which to build applications and provides many key services in the greater story of the Microsoft Application Platform.

SharePoint shows great maturity in terms of its user interface, database design, and workflow and communication features. It provides a standard interface with standard navigation, enabling users to focus on tools and information, not on learning how to navigate new menu controls. SharePoint helps resolve database and business logic issues by providing a powerful complement to structured data — that is, a managed environment to store unstructured data that gets the information and business rules onto the network and out of local Excel files. SharePoint takes advantage of the first workflow platform built into an operating system and makes it easy for developers and power users to use Windows Workflow Foundation (WF) to automate business processes.

SharePoint integrates with IM and email, though you will still want Office Communications Server (OCS, formerly LCS) to audit and manage IM messaging as effectively as you manage email. SharePoint reduces the load on email by providing effective alternatives: appropriate, organic team sites for teams to share information, where teams can use document libraries with versioning, apply enforced "checkout" for editing, and provide links to documents rather than create versioning nightmares by emailing attachments to the whole team for review.

The set of SharePoint Products and Technologies includes two platforms: Windows SharePoint Services (WSS) and Microsoft Office SharePoint Server (MOSS). In a nutshell, WSS is used to create web sites for team collaboration on a common project. MOSS builds on WSS with capabilities for portal publishing, enterprise search, enterprise content management (ECM), business process automation, and business intelligence (BI) reporting and analysis tools. While WSS will serve well the needs of small companies and individual departments, MOSS is designed to be an "enterprise-class" platform to manage and control a company's diverse knowledge assets.

Windows SharePoint Services

Windows SharePoint Services (WSS) is a technology provided as an extension to Microsoft Windows Server 2003 (and above). WSS is free, and if it was not provided as an option when you installed Windows Server, you can download and install it from the Microsoft Downloads site (`http://msdn2.microsoft.com/en-us/downloads/default.aspx`) at any time. According to the Product Team, WSS "provides a platform for collaboration applications, offering a common framework for document management and a common repository for storing documents of all types."

WSS includes *Site Templates* for Team Sites, Document Workspaces, Meeting Workspaces, blogs, and Wikis. Since any site can be saved as a template, it is easy to create your own library of templates for reuse. Microsoft makes a collection available for downloading, and still more templates are available on the web.

Each WSS site may include document libraries, form libraries, calendars, announcements, task lists, issues lists, and custom lists. Each of these is simply a special instance of a list, and each list contains items or rows. What makes each distinct are the columns stored, and the views provided. For example, a calendar contains columns for the event name, start and end dates, and a description. It provides calendar views that you can switch from Daily, to Weekly, to Monthly. But whatever the columns and views, a calendar is simply a collection of items in a list.

WSS 3.0 reintroduced the concept of the *content type*. Companies work with many different types of content — expense reports, presentations, proposals, memos and more — and each of these types might have its own template and metadata fields. Content types let you define and consistently apply the rules for each type, for any page, library, or list in which you've allowed a type to be stored.

Content types can also be inherited, so you might have a base "Presentation" type with fields to store Product, Intended Audience, Duration, and Status (Draft or Final). This type may in turn be inherited by "Internal Presentation," which sets a base PowerPoint template, and "External Presentation," which sets both a document template and additional fields for Event Name and Event Date.

Microsoft Office SharePoint Server

Microsoft Office SharePoint Server (MOSS or OSS) comes in two versions: Standard Edition and Enterprise Edition. Standard Edition is a Microsoft product built upon WSS. MOSS extends WSS with functionality for web content management (WCM), records management (RM), integrated digital rights management (DRM), workflows, Single Sign-On (SSO), document retention and auditing policies, expanded search including People Search, and site variations to ease the maintenance of multilingual sites. MOSS also provides a My Site for each user, with both a private view for storing personal information and a public view to share photos, personal information, and more.

In MOSS, content types can also be associated with workflow and lifecycle policies. For example, you might have a base `Presentation` type, which sets a policy to "review or delete six months after last update." This type may in turn be inherited by `Internal Presentation`, which sets a base PowerPoint template, and `External Presentation`, which sets both a document template and a workflow so that all external presentations first obtain the approval of the marketing and legal departments.

Among the WCM features of OSS is the *Page Layout*. In MOSS, a Master Page may contain a Page Layout, which in turn contains HTML and fields. Page Layouts are great for organizing the body of a page. Each Page Layout is associated with a content type, and the content is stored in the type's fields. For example, you could have a Page Layout for products with a two-column display and a photo in the top left, and another for news items with a banner and a three-column layout. You can associate either of these with a Site Template, for example the Publishing Site, to provide multiple layouts without having to create a new Site Template. In WSS the Site Template and Master Page control page layout. In MOSS, Page Layouts provide many more combinations.

Microsoft Office SharePoint Server: Enterprise Edition contains the features of Standard Edition plus the following: a Forms Server to publish browser-based forms from InfoPath, an Excel Server for spreadsheet publishing, the Business Data Catalog to ease the displaying and searching of external data stores, and data visualization features for reporting and business intelligence.

Both WSS 3.0 and MOSS 2007 are .NET 2.0 applications with XML web service interaction layers and ASP.NET presentation layers (described in depth in Chapter 2).

SharePoint is a secure, reliable, scalable platform for developing enterprise web applications. This book shows you how to accomplish just that.

The Microsoft Application Platform

An application platform is a reliable, reusable set of products and technologies on which to develop and host applications that may span disparate environments and technologies. Each component in an application platform provides a *service*, which may be used by any application in an enterprise. An application, in turn, simulates or provides *business capabilities* to the people who use it. An application platform has a service-oriented architecture (SOA), meaning that each component provides a standard service which may be replaced with an equivalent provider of that service. Figure 1-1 illustrates the general structure of an application platform.

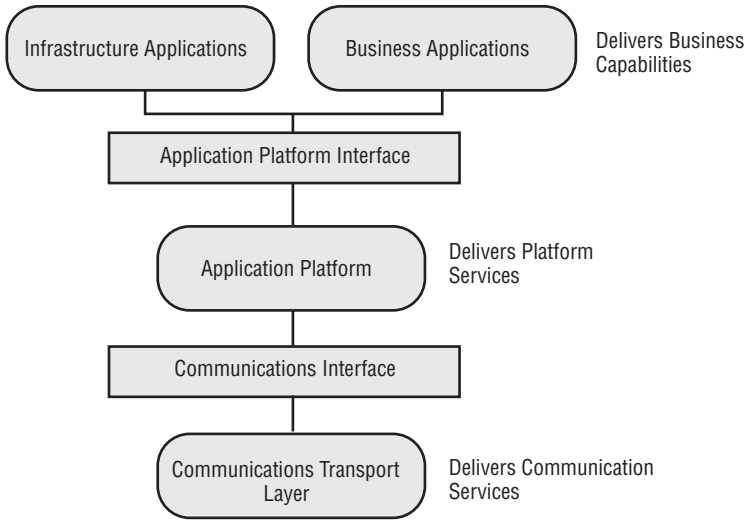

Figure 1-1

SOA has evolved to describe mainly XML web-service-based architectures, but in the context of an application platform a service is simply a platform service and not necessarily an XML web service. An application platform interface may provide access to platform services via a variety of methods. However, the application platform interface does not necessarily act as a broker for service consumers to discover or be matched to service providers. Instead, it is up to the application platform architect to identify and install appropriate service providers to meet the needs of the enterprise.

The *Microsoft Application Platform* (MAP) is a consistent, reusable platform upon which to standardize the development, deployment, operation, and administration of enterprise applications. The potential benefits include lower costs for server hosting, administration, software development, and training, and more efficient processes for the architecture, design, construction, deployment, and monitoring of applications.

To this end, common tools are used throughout the MAP stack:

- *Windows Server* provides a common server platform.
- The *Microsoft Management Console* (MMC) provides a common server management interface.
- The *.NET Framework* and the underlying *Common Language Runtime* (CLR) provide a common language layer for both client and server applications written in a variety of languages.
- *Visual Studio* (VS) provides a common integrated developer environment. *SQL Server* provides a common structured data store.
- And *Windows Workflow Foundation* (WF) provides a common business process engine.

The wonderful thing about common tools is that once you understand how each works, you can venture anywhere in the MAP and reuse that knowledge. And then there is SharePoint. While several technologies anchor the platform, the centerpiece of the MAP undoubtedly is SharePoint. SharePoint is an incredibly rich

ASP.NET application with a powerful object model for implementing applications as web sites. SharePoint can be used to build public web sites, intranets, extranets, and collaborative team sites. It provides the web front end for a growing set of Microsoft products, including Team Foundation Server and Project Server. You can often use SharePoint to build your own enterprise applications without writing a line of code.

It helps to understand how Microsoft describes and positions its application platform. In the aptly titled whitepaper, "What Is an Application Platform?" the opening bars go something like this:

> *The Microsoft Application Platform is a portfolio of technology capabilities, core products, and best practice guidance focused on helping IT departments to partner with the business to maximize opportunity by increasing their ability to drive the right efficiencies, customer connections, and value added services for business growth.*

You may have heard or read this before, whether recently from Microsoft or 20 years ago in the brochure of some other technology. The difference now is that Microsoft has evolved to the point of simplicity and commoditization where it is finally possible to realize the dream.

Microsoft divides its platform into five categories: Data Management, Workflow, Communications, Lifecycle Management, and User Experience. The following sections detail each of these categories.

Data Management

Data management includes all elements of the data chain, from the storage of raw bits and bytes right up to the manipulation and analysis provided by database and file systems. At the application level, data rendered into lists, items, reports, and graphic visualizations is now a reliable, predictable commodity.

Storage

Applications work with many data types, each with unique storage requirements. *SQL Server* is a relational database that is good at storing data, which may be described as a set of entities and their relationships. The *NT File System (NTFS)* is excellent at storing files: executable files, server configuration files, files to be transferred over FTP, files to be served over HTTP, and large files that are not practical to store in a database. *Windows SharePoint Services* is great at storing files used by information workers: Word and other text documents, Excel spreadsheets, PowerPoint decks, MS-Project files, images, and anything else you might find in a typical user's My Documents folder. SharePoint is also great at storing lists: Contacts, Tasks, Issues, Announcements, News, Events, or anything else you like, from your CD collection to "Things to bring to my party."

Reporting

SQL Server Reporting Services is the key reporting tool in the MAP. It provides the web-based Report Manager and produces reports over web services in a variety of formats, including HTML, Excel, and PDF. Reporting Services also provides SharePoint Web Parts to select, configure, and display reports

Analysis

SQL Server Analysis Services allows the powerful analysis of data stored in SQL Server and the construction of data cubes used for OLAP analysis, scorecard analysis, and data mining.

Visualization and Business Intelligence

Data visualization is about building graphs, charts, and other images that represent your data. *Business intelligence (BI)* is what you provide to business decision makers to help them make decisions. Or, as one might say, "When provided with enough knowledge no decision remains. There is only what is to be done."

The MAP provides BI features in *Office SharePoint Server* for building lists of Key Performance Indicators (KPIs) and for the surfacing of these KPIs in BI Web Parts. Microsoft offers *Proclarity* and *Business Scorecard Manager* to allow the construction of more complex business analysis and data-mining visualizations, which may be surfaced in a variety of formats.

Workflow

Windows Workflow Foundation (WF) is ostensibly a developer platform for creating state management systems that implement or support business processes with code. The Office vision for WF integration is to "facilitate human processes by attaching business logic to items and documents in SharePoint, while providing context and tracking progress."

While WF is appropriate for workflow in documents and lists, *BizTalk* is the appropriate platform for multistep transactions on structured data, or the orchestration of data flow and business processes among several enterprise systems.

Communications

A network is quiet without communications. Communication protocols provide reliable messaging features on a network including translation or marshaling across boundaries, and message queuing. On a human level, communication services facilitate conversations.

Office Communications Server (OCS, previously known as "Live Communications Server") hosts real-time messaging services. OCS provides PC-to-PC Voice over IP (VoIP) calls, PC-to-phone calls, instant messaging (IM) services, video, and conferencing services. OCS provides encryption services between Office Communicator clients, and capabilities to archive and audit IM conversations. Most companies have this control with e-mail, and one would expect all will eventually want the same for IM conversations.

IM client applications include Office Communicator (the preferred client) and Windows Live Messenger. OCS allows communication with "foreign" IM networks including Yahoo, AOL and the public Microsoft Live Messenger network.

OCS is also an IP PBX which means that it can act as a company's VoIP phone switch, or it can communicate with an existing IP PBX or TDM switch. This allows integration among OCS transports, an enterprise's phone system (VoIP or traditional), and public phone networks. For example, if you're leaving the office for a meeting, you can forward all calls dialed to your desktop PC or desk phone to your cellular phone, or if you don't respond to a request for a PC-to-PC IM session, the caller could opt to send a message to your cellular phone via SMS. The capability of providing high-quality PC-to-PC voice calls over a WAN instead of incurring toll charges between offices often motivates companies to move to OCS or an OCS-VoIP hybrid.

OCS includes *LiveMeeting*, a web conferencing host ideal for online meetings, whiteboarding, and webcasts. Live Meeting sessions can be recorded for later playback. Live Meeting is also available separately as a hosted service.

Service-Oriented Architecture (SOA)

In an SOA, BizTalk provides a service bus and advanced messaging, enabling any application with a service bus adapter to talk to any other application on the service bus, reducing the development effort for application-to-application communications by an order of magnitude. Both free and commercial adapters exist for a variety of common platforms, including SAP, JD Edwards, and PeopleSoft.

Office Live Server is a hub for real-time conversations between people that combines the previous Live Communication Server (LCS), Communicator, and Live Meeting products. LCS provides secure instant messaging, IP telephony, and Voice over IP (VoIP) services. Communicator is the supercharged client that provides the user interface on the desktop; LiveMeeting is a web-conferencing host which is great for online meetings, whiteboarding, and webcasts. Live Meeting sessions can be recorded for later playback. Live Meeting is also available separately as a hosted service.

In recent times, any application which makes available its functionality through XML web services might be said to adhere to a service-oriented architecture. Though it is beneficial to keep presentation and application layers loosely-coupled, this particular trait is not what was originally meant by "SOA." Instead, the focus of SOA is on standardizing the interfaces of many applications to the point that one application in a category can be substituted for another.

Lifecycle Management

Lifecycle management tools for applications support the development, deployment, and operational management of software.

Development

Visual Studio (VS) is an integrated development environment (IDE) that supports custom development across the MAP. *Visual Studio extensions for Windows SharePoint Services* (VSeWSS) support the development of SharePoint workflow, Web Parts, site definitions, solutions, and more. *Visual Studio Tools for Office* assist in the development of functional extensions to Microsoft Office client applications (e.g., Word, Excel, and Outlook). VSTO supports creation of new ribbon items and document actions, and provides programmatic access to the new event model and XML document formats of the Office 2007 suite.

ASP.NET, Windows SharePoint Services, and Office SharePoint Server all offer powerful APIs and design-time tools for application development.

Visual Studio Team System is a set of Visual Studio editions designed specifically for application architects, developers, and testers. VSTS integrates with Team Foundation Server (TFS) to provide a seamless end-to-end experience for agile software development and software project management. While the default process is based upon the Microsoft Solution Foundation (MSF) v4 methodology, VSTS and TFS can be used with nearly any methodology. Services provided by TFS include scheduling, task assignment, source code control, and bug tracking.

Deployment

Visual Studio creates *installation packages* and *SharePoint Solutions* that facilitate the provisioning of solutions.

MSBuild is a build engine which supports full configuration of the build process. Capabilities include the scripting of pre- and post-build events, and the build-time modification of files (e.g. `web.config`) to

automate the generation of packages for differing environments. The Visual Studio *Web Deployment Projects* (WDP) extension provides an interface for creating MSBuild configuration files.

Operational Management

Microsoft Operations Manager (MOM) provides monitoring, auditing, and alert services across the MAP.

User Experience

.NET *WebForms* (ASP.NET) and *WinForms* provide a presentation layer for the MAP. Each provides a standard set of controls for constructing user interfaces, one for the web and the other for desktop applications.

Windows SharePoint Services builds on ASP.NET to provide a more powerful and consistent user experience than ASP.NET alone. Beyond the consistent set of controls found in ASP.NET, WSS supports the creation and configuration of the pages and sites themselves, allowing the no-code construction and deployment of collaborative web sites. This is a simplified description that unfolds in the next chapter.

A recent development in .NET is the Windows Presentation Foundation (WPF) which is a performing cross-platform alternative to Macromedia Flash.

A Service-Oriented View of the Microsoft Application Platform

The Open Group is a consortium that mainly deals with open standards and interoperability among technologies that originated on UNIX or Linux systems, for example, LDAP. It does a good job of describing the standard services found in an application platform, and it is an interesting exercise to map the Open Group model to the Microsoft stack. According to the Open Group, an application platform consists of the following standard service categories: Data Interchange Services, Data Management Services, Graphics and Imaging Services, International Operation Services, Location and Directory Services, Network Services, Operating System Services, Software Engineering Services, Transaction Processing Services, User Interface Services, Security Services, and System and Network Management Services. Figure 1-2 shows both the Open Group Service Map (left) and the Microsoft Application Platform Service Map (right).

It is convenient to replace *Graphics and Imaging Systems* with the more general *Media Services* category. This new category then contains Graphics and Imaging Services, Animation Services, and Audio and Video Services. Also, *Transaction Processing Services* are omitted and described instead as a feature of *Data Management Services*.

In addition, the Open Group defines standard *infrastructure applications*, which are built on and extend the capabilities of the application platform. While the capabilities of infrastructure applications are also well standardized and somewhat generic in the industry, the key differentiator is that these applications do provide (or simulate) business capabilities rather than platform services, and are typically designed with user interaction in mind.

The Open Group classified Workflow Services, Publish and Subscription Services, Payment and Funds Transfer Services, Calendar and Scheduling Services, System Management and Monitoring Services, and

Web Browsing Services as infrastructure applications. This implies that more than one implementation of each might exist for a given enterprise platform. We now know this implication is not necessary.

It is possible that the Open Group classified these as infrastructure applications rather than as platform services for a couple of reasons. For one, these services can be built using the application platform and so are "a level above," or derivative of the platform. Or, it could be because until recently these scenarios were typically built as one-off applications rather than as generic platform services; a typical development project would be to construct a Capital Requisition workflow application, not a Workflow Framework. The fact that the Open Group chose to include International Operations as a platform service lends strength to this argument. In the Microsoft stack shown on the right-hand side of Figure 1-2, you can see that several of these are now first-class platform services upon which applications are built, and not simply tacked-on instances.

The categories used by the Open Group are convenient to describe application platform services, though the definitions described here will differ from the official Open Group specification.

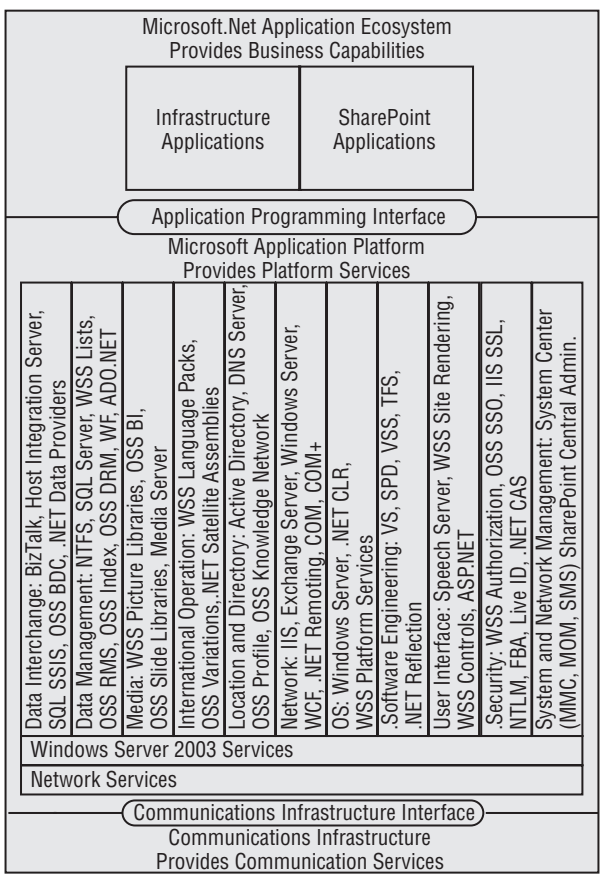

Figure 1-2

Data Interchange Services

Data Interchange Services support the exchange of information between the application platform and external systems. Examples include importing data from a DB2 database hosted on an external AS/400 server into SQL Server, the translation of an invoice from a supplier's XML format to your own in an electronic data interchange (EDI) system, the conversion of an incoming fax into a TIFF file that can then be stored in a file system, or the encoding of video into a computer-playable format.

The following table lists the Microsoft technologies that provide Data Interchange Services and describes the specific services and framework features provided by the technologies:

Microsoft Technology	Data Interchange Services and Features
BizTalk	*Data Mapping Services* provide interoperability among data storage systems by clearly identifying data sources, destinations, and transformations. *Data Orchestration* provides workflow for business systems by describing the orchestration of business processes involving more than one system.
Host Integration Server	*Data Adapter Services* include TCP/IP and SNA services, which allow connectivity to data stored on hosts, including IBM mainframes and AS/400s. A common scenario is to interoperate with an IBM DB2 database.
SQL Server	*Integration Services (SSIS)* provides data integration with external systems. SSIS supports the movement and optional transformation of data into or out of a SQL database.
Office SharePoint Server	*Business Data Catalog (BDC) Services* allow for the definition of connections to external data stores including web services, SQL Server stored procedures, and ODBC sources. The BDC offers a common object model and user interface components (Web Parts). *Document Conversion Services* allow the automatic conversion of documents. Built-in converters include Word-to-HTML and Word-to-PDF converters.
.NET Framework	*Data Providers* provide a common interface for "plugging in" connectivity to database platforms. This creates a loosely coupled relationship between connecting to the data and subsequent manipulation. Standard .NET data providers include SQL Server, Oracle, and ODBC.

Data Management Services

Data Management Services support the storage, manipulation, and retrieval of data, and optionally support transaction management as a guarantee of data integrity. Query processing, data-reporting, and analysis services once existed mainly as applications distinct from data management service providers (e.g., Crystal Reports and Cognos Business Intelligence), but these capabilities are now commonly integrated into the data management layer.

The following table lists the Microsoft technologies that provide Data Management Services and describes the specific services and framework features provided by the technologies:

Microsoft Technology	Data Management Services and Features
NTFS	*File System Services* allow for the discovery, storage, and retrieval of files, which may hold data, configuration, or executable instructions.
SQL Server	*Relational Database Management System (RDBMS) Services* provide for the structural definition, storage, retrieval, querying, and manipulation of relational data. *Reporting Services* support the definition, management, calculation, and rendering of reports. *Analysis Services* support data-mining capabilities, including the definition, management, calculation, and rendering of data cubes. *Transaction Services* guarantee that multistep operations will succeed or fail as a single unit, and not partially. *Replication Services* facilitate the replication of data from server to server, optionally with a witness service to guarantee transactional integrity.
Windows SharePoint Services	*Database Services* provide for the structural definition, storage, retrieval, and filtering of lists and list items. *Index Services* enable the indexing and subsequent querying of SharePoint objects and their metadata.
Office SharePoint Server	*Document Lifecycle Management Services* provide for the definition and enforcement of policies per document type (a.k.a. "content type"). Processes and rules in the definition may include major and minor versioning, rules for retention, associated workflow processes, and rules for authorization (i.e., digital rights management). *Records Management Services* provide a managed repository for the secure storage, controlled access, and enforced auditing of data declared as a "record." *Index Services* in OSS gain capabilities beyond WSS, including the indexing of data stored external to SharePoint such as imported Active Directory profiles and data described by the Business Data Catalog. *Digital Rights Management Services* ensures that rights assigned in a document library travel along with documents as they are opened or downloaded from the library.

Continued

Microsoft Technology	Data Management Services and Features
Windows Workflow Foundation (WF)	*Workflow Services* provide a common execution engine for the management of states and transitions as information moves through a process involving one or more applications.
.NET Framework	The *ADO.NET* programming model allows the in-memory representation, manipulation, and querying of relational data. The *XML* object model provided by .NET allows the in-memory management of hierarchical data.

Media Services

Media Services support the creation, manipulation, and distribution of media assets, including images, animation, video, and audio. Creation includes automatic generation or rendering, for example, the rendering of objects, skins, and textures in a video game. Manipulation includes the use or modification of existing artifacts, for example adding an echo effect to an audio sample, or adding titles to a video sequence. Distribution includes the broadcast or streaming of audio or audio-video files. The Open Group specification also includes the storage and retrieval, but even a digital asset management system is more appropriately considered a form of data management service, and this layer operates independently of the media being stored and retrieved.

Examples include Data Visualization Services, Flash Server, the graphics subsystem of any operating system or video game console, and Windows Media Server. The following table lists the Microsoft technologies that provide Media Services and describes the specific services and framework features provided by the technologies:

Microsoft Technology	Media Services and Features
Windows SharePoint Services (WSS)	*Picture Library Services* provide a user interface and basic data structure for the browsing and management of images.
Office SharePoint Server	*Business Intelligence Visualization Services* (delivered as Web Parts) provide a user interface for Analysis Services and Business Intelligence Services. *Slide Library Services* provide a user interface and smart client (PowerPoint) integration for the storage and management of presentation slides.
SQL Server Reporting Services	*Reporting Services* (delivered as web services) render reports in a variety of formats including HTML, Excel, and PDF.
Microsoft Media Services	*Media Services* provide for the creation, digital rights management (DRM), and streaming or broadcast of audio, video, and television content.
.NET Framework	The *.NET Framework* provides classes and methods for rendering images at runtime.

International Operation Services

International Operation Services provide a means to build applications independently of the language or locale in which they will be presented or operated and allow extending an application to support additional language or culture-specific interfaces. To enable the construction of culturally distinct applications, International Operation Services provide a means of storing and rendering information about: character sets, data representation (e.g., numbers, dates, and currency), and media resources including on-screen text, graphics and associated audio. Content stored in an application is in the realm of Data Management Services, but if services related to a specific structure or schema are provided by the platform to aid in the storage and retrieval of multi-cultural content, that aspect is an International Operation Service.

The following table lists the Microsoft technologies that provide International Operation Services and describes the specific services and framework features provided by the technologies:

Microsoft Technology	International Operations Services and Features
Windows SharePoint Services	*Language Packs* install language-specific Site Templates for SharePoint.
Office SharePoint Server	*Content Management Services* provide the Site Variation feature which allows designation of one primary site branch (e.g., `http://myserver/en/default.aspx`) and one or more tertiary site branches (e.g., `http://myserver/fr/default.aspx`). New sites in the primary branch are automatically distributed to the tertiary branches for translation.
.NET Framework	The *Resource File* and *Satellite Assembly* model allow a UI to contain placeholders for text and graphics, which are replaced at runtime by mappings defined in a culture-specific Resource File. Resource Files are packaged and distributed as Satellite Assemblies.

Location and Directory Services

Location and Directory Services support the naming, registration, search, and retrieval of metadata of resources, primarily to identify the names and addresses used to locate resources on a network. With respect to authentication, a Directory Service may act as a credential store and group membership service, but Security Services are responsible for challenging a consumer to provide credentials and controlling access to resources.

Examples include Lightweight Directory Access Protocol (LDAP), Active Directory (AD), Domain Name System (DNS) services, and Universal Description, Discovery and Integration (UDDI) services. The following table lists the Microsoft technologies that provide Location and Directory Services and describes the specific services provided by the technologies:

Microsoft Technology	Location and Directory Services and Features
Active Directory (AD)	*Directory Services* of AD allow Users and Computers in a security zone to be managed in a directory tree, as well as the definition of Groups, and the association of Users with Groups. Attributes of the User schema are extensible. For authorized entities, AD also supports queries to list members or to verify group membership. *Authentication Services* provide credential management and positive identification of entities (users or agents) upon request. AD is designed to comply with the IETF *Lightweight Directory Access Protocol (LDAP)*.
Domain Name System (DNS) Server	Directory Services provided by DNS Server translate domain and computer host names into IP addresses.

Network Services

Network Services define the services and protocols available to distributed applications where components that compose the application or resources used by the application exist at different logical or physical locations on a network. Examples include Hypertext Transport Protocol (HTTP), electronic mail services (SMTP and POP3), network time services (NTP), remote print services, file replication services, voice over IP services (VoIP), remote process invocation (e.g., RPC), videoconferencing services (e.g., H.323), and text messaging services (e.g., SMS).

The following table lists the Microsoft technologies that provide Network Services and describes the specific services or framework features provided by the technologies:

Microsoft Technology	Network Services and Features
Internet Information Server (IIS)	*Hypertext Transport Protocol (HTTP) Services* implemented by IIS enable the hosting of web applications and web services (see *Operating System Services*). *File Transport Protocol (FTP) Services* implemented by IIS enable remote File Management Services.
Exchange Server	*Electronic Mail Services* allow the receipt and transmission of electronic mail. *Shared Calendar Services* support the central storage and management of event calendars.

Microsoft Technology	Network Services and Features
Windows Server	*Network TCP/IP Services* allow communication among the services hosted both within a server and external to a server. *Replication Services* facilitate the distribution or "mirroring" of files stored in NTFS from a primary server to alternate servers.
Windows Communication Foundation (WCF)	*Communication Services* provided by the WCF provide a secure, reliable mechanism for applications to communicate via HTTP web services.
.NET Framework	*Remoting Services* provide a mechanism for applications to communicate over any TCP/IP channel. The .NET Framework provides integration with Component Object Model (COM) Services, COM+ and related technologies to enable communication with COM-based services. COM-based services include Microsoft Message Queuing (MSMQ), Active Directory (AD), and Windows Management and Instrumentation (WMI).

Operating System Services

Operating System Services support loose coupling between the description of applications as programming language instructions, and the hardware that executes those instructions. Subcategories include operating systems and virtual machines. Examples include the Windows application programming interface (API), the .NET Common Language Runtime (CLR), and the Java Virtual Machine (JVM). Virtualization Services such as Virtual Server and VMWare are not included in this category as their existence should be completely irrelevant to applications.

Note that this definition is a general version of the Open Group specification, which defines OS Services solely as the layer between an application and physical hardware, and does not include the further abstraction made possible by virtual machines.

The following table lists the Microsoft technologies that provide Operating System Services and describes the specific services and API features provided by the technologies:

Microsoft Technology	OS Services and Features
Windows SharePoint Services	*Collaboration Services* are provided by Windows SharePoint Services (WSS), which is a free component of Windows Server executed on an instance of the .NET CLR hosted inside an IIS web application.

Continued

Microsoft Technology	OS Services and Features
.NET Common Language Runtime (CLR)	*Virtual Machine Services* of the CLR provide a common execution language for Microsoft .NET languages. The only criteria for .NET languages are that they comply with the Common Language Infrastructure (CLI) specification and compile to MSIL, which is the language executed by the CLR.
Windows Server	Windows Server provides Web Application Hosting Services implemented by Internet Information Services (IIS). The Windows application programming interface (API) provides access to server resources not managed by the CLR.

Software Engineering Services

Software Engineering Services support the design and construction of applications. Examples include Visual Studio, SharePoint Designer, Team Foundation Server, Visual Source Safe, SourceGear Vault, language compilers (e.g., C#, VB.NET, IronPython and Ruby), script interpreters (e.g., Classic ASP) and build management services (e.g., MSBuild).

The following table lists the Microsoft technologies that provide Software Engineering Services and describes the specific services and framework features provided by the technologies:

Microsoft Technology	Software Engineering Services and Features
Visual Studio (VS)	VS is an *integrated developer environment (IDE)* which supports the design, construction, compilation, and testing of applications on the Microsoft Application Platform.
SharePoint Designer (SPD)	SPD is an IDE for SharePoint. SPD supports the management, extension, and modification of sites, data structures, and workflows.
Visual SourceSafe (VSS)	*Source Code Management Services* allow the controlled storage and management of applications' source code.
Team Foundation Server (TFS)	TFS provides *Project Management Services* specific to team software development projects with features supporting the architecture, development, testing, and bug tracking of applications.

Microsoft Technology	Software Engineering Services and Features
.NET Reflection	Reflection allows .NET code to inspect or emit .NET code. Reflection can infer information about assemblies, modules, types, parameters, and other .NET objects by examining their metadata. Reflection emits code by dynamically generating Microsoft Intermediate Language (MSIL) opcodes; for example, to create dynamic types or their instances, or to invoke methods.

User Interface Services

User Interface Services define how users interact with an application. Examples include Web Browser Services, Speech Recognition Services, Text-to-Speech services, Print Services, and Computer-Based Training Services (e.g., SCORM servers).

The following table lists the Microsoft technologies that provide user Interface Services and describes the specific services and framework features provided by the technologies:

Microsoft Technology	UI Services and Features
Speech Server	*Speech Recognition Services* support user interfaces controlled by voice or phone keypad rather than by keyboard or mouse.
Windows SharePoint Services (WSS)	*Content Management Services* in WSS start with an HTTPModule that interprets each requested URL and composes the output with that URL's configured Asp.NET Master Page, SharePoint Page Layout, SharePoint Configuration, SharePoint Personalization, and SharePoint Content. WSS includes a *Web Part Zone* object, which hosts Web Parts on SharePoint-hosted pages. The SharePoint Web Part Zone differs from the ASP.NET Web Part in that it provides backward compatibility with WSS 2.0 Web Parts, while the ASP.NET version supports the hosting of user controls (`.ascx`). Aside from this exception, the WSS user interface is almost entirely implemented with ASP.NET.

Continued

Microsoft Technology	UI Services and Features
ASP.NET	*User Interface Services* provide a programming model and runtime browser utilities (e.g., JavaScript code) for the construction, rendering, and configuration of cross-platform HTML, DHTML, and CSS. *Personalization Services* allow users to personalize Web Part configuration in any given ASP.NET or SharePoint page.
.NET Framework	The .NET Framework provides a development platform for Desktop Applications (a.k.a. "WebForms") and Web Applications (a.k.a. "WinForms").

Security Services

Security Services secure application resources so that only authorized entities have access to them. Therefore a Security Service is responsible for authenticating the identity of one who requests access to a resource (AuthN), confirming that the identity is authorized to access the resource (AuthZ), ensuring that credentials are kept confidential in transit, and ensuring the appropriate protection of the application resource both as it is stored and transmitted. Security Services often rely upon secure credential stores provided by a Directory Service and access control lists stored with a secure Data Management Service.

Security categories include: Authentication Services, Authorization Services, Security Auditing Services, Trusted Communication Services (e.g., SSL), Cryptographic Key Management Services, Encryption Services, and Single Sign-On (SSO) Services.

The following table lists the Microsoft technologies that provide Security Services and describes the specific services and framework features provided by the technologies:

Microsoft Technology	Security Services and Features
Windows SharePoint Services	*Authorization Services* provide management of Access Control Lists (ACLs) at the levels of Farm, Site, List, and List Item. ACL entries pair AD Users, AD Groups, and custom site groups with site roles. Site roles are associated with permission levels, which may be customized or extended. *Permissions assigned in a site* are inherited by child sites and contained lists, and *permissions assigned in a list* are inherited by contained list items unless the inheritance is explicitly broken. Whenever inheritance is broken, a new ACL is created for the object.

Microsoft Technology	Security Services and Features
Office SharePoint Server	*Single Sign-On (SSO) Services* in SharePoint provide a credential store to associate authenticated SharePoint users and service accounts with additional credentials required to access external resources. *Information Rights Management Services* bind a user's document library permissions with document permissions, which are applied to the document whenever a document is opened or downloaded from SharePoint. The document is encrypted locally for offline protection.
Internet Information Server	*Trusted Communication Services* implemented by the Secure Sockets Layer (SSL) transport to provide encryption for HTTP conversations between two machines. *Configuration Services* allow the selection of Anonymous, NTLM, or certificate-based authentication.
.NET Framework	The Membership Provider model allows for the loose coupling of an authentication model and presentation-layer features, including login, logout, and change password controls. Out-of-box providers include NTLM Authentication, Forms-based Authentication (FBA), and Windows Live (aka Passport) Authentication. The Code Access Security (CAS) model requires that running code be provided with explicit permissions to access resources. Encryption services provide standard libraries for the encryption and decryption of data.

System and Network Management Services

System and Network Management Services support the deployment, configuration, monitoring, and fault management of applications and the network resources that serve applications. Examples in this category include configuration management (CM) services for all component resources, performance monitors and indicators, fault detection monitors with response escalation, accounting management services to calculate chargebacks on usage, capacity management services to monitor resources and proactively plan expansion, and specific management tools for Print Services, Storage Array Services, and other network appliances.

This is a two-way street — your applications should include services that allow for their programmatic configuration, monitoring, and administration by System and Network Management Services. When it comes time to build test harnesses, to populate your application with data, or to plug your application into a continuous monitoring tool like Microsoft Operations Manager (MOM), you will likely discover that a little extra attention in this oft-neglected area provides great returns.

The following table lists the Microsoft technologies that provide System and Network Management Services and describes the specific services and framework features provided by the technologies:

Microsoft Technology	**System and Network Management Services and Features**
Microsoft Operations Manager (MOM)	*Monitoring Services* provided by MOM allow the real-time monitoring and logging of servers, applications, and network appliances on a network. *Publish and Subscribe Services* allow people and processes to subscribe to and presumably act upon events raised by MOM.
Systems Management Server (SMS)	*Deployment Services* provided by SMS facilitate the automatic installation and upgrade of software installed to machines within a physical or logical zone.
Windows SharePoint Services	*Configuration Management Services* allow the assignment of servers to roles in a SharePoint farm.

Summary

This chapter provided you with a solid foundation on which to expand your SharePoint knowledge. By now, you should have a firm grasp on the difference between SharePoint Services and SharePoint Server, and be familiar enough with the Microsoft Application Platform to use it effectively. This chapter touched on data management, lifecycle management, workflow, and communications, before delving more deeply into a service-oriented view of the Microsoft Application Platform. The next chapter covers what you need to know related to the development platform specifically, and walks you through setting up your development environment.