Make Remote e-Learning Authoring A Reality

Mike Alcock explains how the latest generation of Microsoft technologies can generate a new paradigm for the creation of online learning.

How e-Learning Has Been Traditionally Developed

If you are a developer of on-line e-learning courses, there's a good chance that you are using a traditional 'desktop' authoring tool to create your courseware. If this is the case, then the following development process is probably fairly familiar to you:

- Content is authored on one or two desktop PC's using a client side application such as a Windows based desktop authoring tool.
- The content is then assembled onto a single PC for desktop testing and local quality assurance (QA).
- Next the content is uploaded using ftp to a server and the authors await comments, changes and quality assurance notes from the testing team.
- The raft of fixes and changes required are then carried out using the desktop authoring tool on a single PC.
- The content is again uploaded using ftp to the server and the authors then await the next round of comments, changes and QA.
- The cycle above is then repeated for the life of the project – even for many years after the initial go-live date.

The inherent problems with this methodology include:

- The desktop authoring tool has to be used to update the courses, meaning that courses can only be created and updated from one or two PC's, and only by users who know how to use the (often) complex authoring tool.
- Once a course is published and uploaded to the server, it is disconnected from the authoring environment, making it difficult or impossible to edit on the server.
- The expertise to change courses, and create new ones, resides with one or two 'programmers', who know how to use a specialist e-learning tool.
- QA is carried out as an email 'paper trail' by one or two authors. The QA team can only comment on the course and send change requests to the authoring team. This in itself is often a longer process than if they were able to update the courses themselves.
- True collaborative development is difficult or impossible.

The Emergence Of A New Computing Paradigm

With the introduction of the Microsoft.NET framework, we can turn this traditional e-learning production model on its head, by

utilising the inherent power of this new computing model.

What Is The Microsoft.NET Framework?

The Microsoft .NET Framework is the foundation of all future Windows based applications, enabling software developers to deliver:

- solutions that are easier to build, deploy and integrate.
- smart Windows clients that provide immediate on-line access and full functionality at remote sites.
- dramatically reduced IT support costs, improved reliability and availability.
- scalable solutions that can grow with an organisation.
- future proofed technology.

The .NET Framework In Detail

The .NET Framework is a development and execution environment that allows different programming languages and libraries to work together seamlessly to create Windows-based applications that are easier to build, manage, deploy, and integrate with other networked systems.

The .NET Framework consists of:

- **The Common Language Runtime (CLR)**

  A language-neutral development & execution environment that provides services to help manage application execution.

- **The Framework Class Libraries (FCL)**

  A consistent, object-oriented library of pre-packaged functionality.

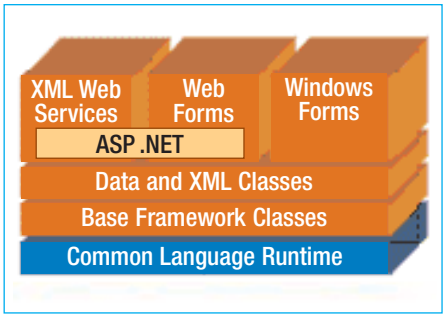

Figure 1. The .NET components

The .NET Framework provides the basic infrastructure that Windows-based applications need to make Microsoft's .NET vision of connecting information, people, systems, and devices a reality:

- **Support For Standard Networking Protocols And Specifications**

  The .NET Framework uses standard Internet protocols and specifications like TCP/IP, SOAP, XML, & HTTP to allow a broad range of information, people, systems, and devices to be connected

- **Support For Different Programming Languages**

  The .NET Framework supports a variety of different programming languages so developers can pick the language of their choice

- **Support For Programming Libraries Developed In Different Languages**

  The .NET Framework provides a consistent programming model for using pre-packaged units of functionality (libraries) which ensures that application development is faster, easier and cheaper

- **Support For Different Platforms**

  The .NET Framework is available for a variety of Windows platforms, which allows people, systems, and devices to be connected using different computing platforms, e.g. people using desktop platforms like Windows XP or device platforms like Windows CE can connect to server systems using Windows Server 2003.

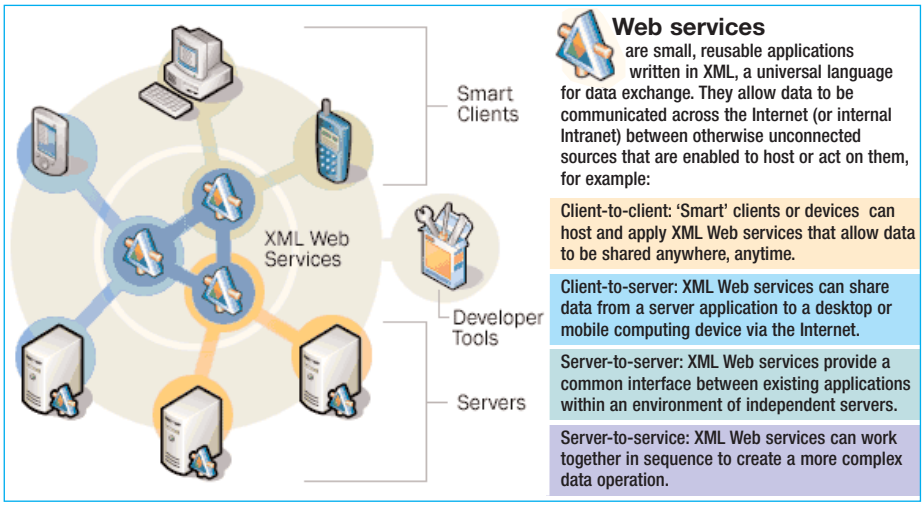

Figure 2. The .NET infrastructure

The .NET Framework In e-Learning

By using this technology, we can overcome all of the traditional problems described above, and open up a whole new way to create, edit, QA and deploy e-learning. Effectively, we can turn the traditional e-learning production model on its head.

By applying this new technology to e-learning, we can now:

- Author directly on the e-learning server ('remote' authoring).

We can now build e-learning authoring tools that are 'smart' Windows clients. These can provide immediate on-line access and full functionality at remote sites via direct connections to e-learning servers using web services. Effectively, from our desktops we are authoring content directly on the e-learning server. This process of 'remote' authoring is entirely transparent to the user.

For example, from my desk in Nottingham, I regularly create and edit courses on servers in the United States, Manchester, Kiev, The United Arab Emirates and other locations around the globe. This all happens seamlessly (I just tell our software which server I want to connect to) and I have the power of a full Windows application with which to create and edit remote content.

Because courses are authored directly on the server, content can be instantly deployed as soon as any changes have been made. The concept of ftp upload is now redundant.

- Author collaboratively from multiple PCs, anywhere in the world.

As can be seen from the architecture diagram (Figure 3, overleaf), collaborative development is now easily achieved, because all authors and content managers are working together on the same server. No longer do we need to check in and check out content, ftp upload or download content, or work on a single section of a course for subsequent assembly.

In practice, I can solve support calls from

my customers in real time. They will often be working on a course, and I can connect to the same server and look at the slide that they are struggling with, and fix it before their eyes. In the bad old days, I would probably have asked them to 'ftp' me the course with the problem, and worked out a solution for them several hours or days later.

- Dynamically change content from PCs, anywhere in the world.

So long as the 'smart' Windows client is installed and the server is available on the Internet (or a corporation's Intranet), content can be edited and updated around the world. Many collaborative tools have built this sort of functionality through a pure browser based solution, but this will severely limit the functionality because of the limited capabilities of a web browser. With a .NET 'smart' Windows client, the full functionality of a powerful, graphical Windows application is available to authors around the globe.

- Change content through a web browser, anywhere in the world.

If we develop a browser based interface to the e-learning server, to run alongside our 'smart' Windows client, we increase the flexibility of our solution further. We don't even need our 'smart' Windows client to be able to start working on our courses. With just a browser based interface to the server, courses can be edited and republished from almost any PC in the world, without the need for additional software. This opens up the scary prospect of your boss phoning you whilst you are on your honeymoon in the Caribbean and asking you to go to the nearest Internet café to fix a course!

In addition, this browser interface allows us to drastically reduce the QA cycle on our projects. Instead of having team members making notes of all the problems, typos etc in a course and then sending the authors a huge list of changes, the QA team can now edit the courses themselves. It probably takes someone around 5 minutes to explain that the word 'Daimler' on line 4 of paragraph 5 on screen 748 of the new induction system has been spelt 'Diamler'. The QA person can now fix this problem in less than 30 seconds.

In practice this dramatically reduces the QA cycle on our projects. A recent example is where a client of ours produced a software simulation comprising of over 4,500 screens of content. The entire project was completed in around 10 weeks, with just one week required for the QA cycle.

- Allow Subject Matter Experts to create, edit and publish content.

Good user interface design and functionality implementation is always required to make software easy to use. Again, with the latest generation of Microsoft .NET development tools this is far easier to achieve than with traditional programming software. We have developed our own programs using this technology in record time, using the skills of different developers who use C# and VB.NET.

You can now easily produce 'smart' Windows clients that allow non programmers to create and edit highly graphical, non-linear e-learning content.

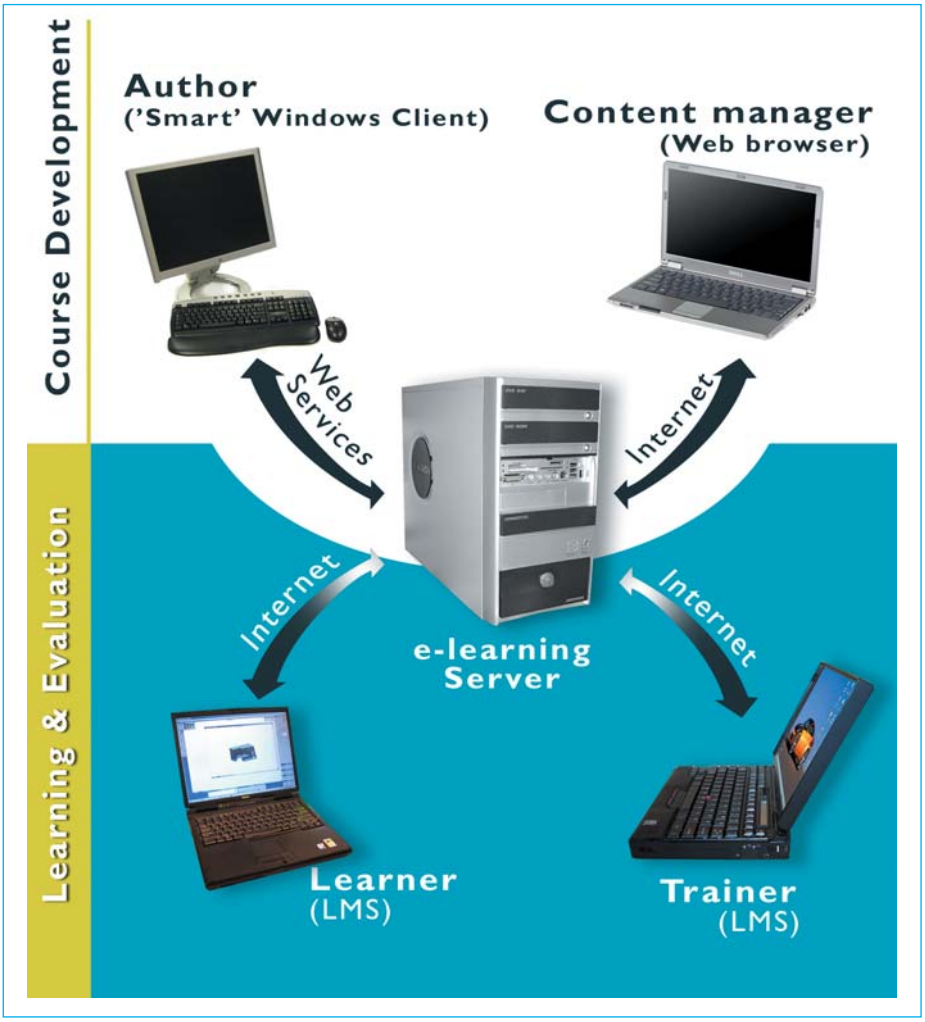

Figure 3. The new e-learning Architecture.

You can remove the need for programming skills or complex flow charts to produce courses. We are now getting to the stage where non-programmers, who can use an application such as PowerPoint, can create the most complex interactive e-learning courses with ease.

From an editing point of view, if we need staff to make just basic edits or QA changes to existing courses, we can just give them the browser based interface. If you can surf the Internet, you can update courses as required.

Conclusion

To conclude, there is now a new way to develop applications software and architectures which will revolutionise the future of computing.

This technology can be applied to almost every application type, and this is happening today. Applying this to e-learning is creating a new authoring paradigm that can deliver significant benefits to end user organisations.

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