

ArcGIS for Developers—An Introduction

Jim Barry and Andy Gup introduce the ArcGIS platform and the toolkits, APIs, and resources available to developers.

<http://video.esri.com/watch/653/arcgis-for-developersan-introduction>

Video Transcription

00:01 Hi, my name is Jim Barry. I'm with Esri in Redlands, and I'm the program manager for the EDN program.

00:06 And with me, as always, is my trusty sidekick Andy Gup.

00:13 Or I'm your sidekick.

00:14 One or the other. Anyways, you can reach us on Twitter using those names.

00:18 But welcome! This is ArcGIS for Developers—An Introduction.

00:22 Very high pass, very introductory level look at ArcGIS.

00:28 You've seen a lot over the past few days, and you've probably used ArcGIS for many years.

00:33 And Esri, for many years, has put out professional GIS products that you can use...

00:38 ...to manage spatial data, do good spatial analysis, good cartographic output.

00:44 But also, for almost as long, we've been very aggressive about putting out SDKs and APIs...

00:49 ...and exposing even so much as scripting languages on some of our...

00:53 ...on our products in order to allow people to customize their use of the product and, in some cases...

01:00 ...build applications where our components are completely embedded within yours...

01:02 ...parcel valuation, service requests, and those types of things.

01:04 ...almost to the point where you can't see it.

01:06 So it's a big landscape, so the idea today is to give you a high pass.

01:11 It's basically to answer the question, I know you can't go into detail right now, but just show me...

01:16 ...the whole the landscape so that I can pick what I'm interested in and dive in a little bit further...

01:21 ...whether that be additional sessions this week or, perhaps if you take a look at some of the tutorials...

01:26 ...or training videos or other types of resources we have on the Resource Center.

01:30 Or, perhaps if you go to the Developer Summit that we run each March in Palm Springs.

01:35 How many of you have gone to the Developer Summit?

01:38 Okay, some of you.

01:39 It's a great experience for geospatial developers.

01:42 Best conference for that to get real deep-dive stuff into our developer technologies.

01:48 Exactly not what we're doing today.

01:50 So basically what we want to show you very quickly, what is there, what can you do with it...

01:54 ...what resources are available for you so that you can get started and get the most from it...

01:59 ...and then where is the community? So who are you?

02:02 We're assuming that you're either an experienced GIS professional that may be new to tinkering around...

02:07 ...with the developer tools or, maybe you're an experienced developer...

02:12 ...but you're new to things geo, you're new to GIS.

02:15 So you develop apps but you want to bring maps into them.

02:19 So if I can ask, just a show of hands.

02:20 How many of you consider yourselves to be GIS professionals, maybe a little bit new to the developer stuff?

02:26 Okay, about half the room.

02:27 How about the others?

02:28 Experienced developers, maybe a little bit new to GIS?

02:31 Okay, so about roughly a half.

02:34 But also, there's management, project leads, it's good to have a picture of what's capable...

02:40 ...even if you're not the one that's actually going to be designing, but you're the one that's responsible...

02:43 ...for its completion and knowing what can be done.

02:46 So if you're here as well, that's great.

02:48 So what we're going to cover is ArcGIS, but from a developer angle.

02:53 We're going to look at it as a developer toolbox.

02:55 What kinds of applications, SDKs, APIs, and scripting languages are there for you...

03:00 ...to build applications and customize the way that you do GIS with ArcGIS?

03:06 We're going to cover desktop applications, high pass.

03:09 I'm actually going to do a quick demo or two for you to show how quick it can be to at least get started.

03:14 I'm not going to say the whole thing is easy, because it's not.

03:17 But it's easy to get started, and it's easy to grow, and we provide plenty of resources for that.

03:23 Then I'll go a little bit into geoprocessing and the Python scripting language...

03:27 ...either interactively or to create tools, also talk to you about what your options are...

03:32 ...as developers with regards to managing and using geodatabases.

03:36 Then Andy's going to take over and show you the client/server angle, web applications...

03:40 ...mobile applications, map services, how to create a customized GIS by leveraging...

03:47 ...the client/server technologies and developer tools.

03:50 And then I'm going to take a couple of minutes and go through developer resources.

03:53 It's not enough for us to show you what's possible...

03:55 ...we want to show you what is available to you that you can use and dig in.

03:59 And, you know, it's not just here's the technology, good luck...

04:02 ...there's a whole set of resources that are available for you to use.

04:05 If you're new to GIS, what is GIS, if you've ever seen on the esri.com website...

04:10 ...it's a good place to start.

04:12 It explains what GIS is and shows some case studies for how people are using it.

04:16 There's also gis.com that goes into this stuff a little bit more, also it has tabs for learn GIS careers and GIS.

04:24 It kind of gets a good feel for what types of things are being done.

04:28 You've probably seen this slide before, ArcGIS 10, the Complete System.

04:32 What Andy and I are going to show you today is not the complete system...

04:35 ...but we're going to touch each one of these points and look at it through a developer's lens.

04:42 Let me start with ArcGIS Explorer.

04:43 The reason why I start here, it's the freest thing you can do.

04:47 You can download, it's a Windows application that anyone can freely download and install and use.

04:52 It's a spinning globe, sure, but you can add your own local data to it...

04:57 ...you can reach out and touch and bring in map services.

05:01 You can also bring in some fairly advanced geoprocessing services.

05:05 So what a lot of people don't know is, with ArcGIS Explorer, you can actually...they say well...

05:09 ...that's a nice spinning globe viewer for map visualization, but you can tap into geoprocessing services.

05:16 You can use ArcGIS Explorer pretty aggressively...

05:18 ...to do some GIS processes that are normally a bit heavier.

05:23 So it's free to use.

05:25 It's free to develop against.

05:26 You can download the SDK for free, and then you can also deploy for free.

05:30 There's no license manager...

05:32 ...there's no license control or authorization files or royalties or license fees that have to be paid.

05:38 Everything from top to bottom, from the application to the SDK...

05:41 ...to developing and deploying, you can do for free.

05:45 And there's really two options for developers.

05:47 One is application configuration without any code whatsoever.

05:51 ArcGIS Explorer is designed very liberally to be able to change the interface...

05:58 ...to change the appearance of the application, to change the colors and the schemes...

06:02 ...and the tools and the ribbons and the logos and the splash screens so that you can really turn...

06:08 ...and save that customization, or save a bunch of those customizations...

06:11 ...and really turn that application into yours.

06:14 Something that's really custom-tailored to, let's say, I need an application that just does three things.

06:20 I don't need to train my users, just need them to do three things.

06:23 ArcGIS Explorer provides a customization way to do that.

06:27 The second option is the ArcGIS Explorer SDK.

06:29 You can create your own add-ins.

06:31 You can create your own buttons with code that you write against our SDK or through Visual Studio...

06:36 ...with other components to bring additional functionality...

06:40 ...that you develop into ArcGIS Explorer that wasn't there.

06:44 So application configuration, we give you a manager application and it gives you a bunch of tabs...

06:51 ...and lots of check boxes and lets you really dial that thing into the way that you want it to look like...

06:55 ...and then save that configuration and share that configuration...

06:58 ...with anyone or with everyone in your organization.

07:04 The SDK is very well documented, there's conceptual help, there is sample code...

07:10 ...there is basically object model diagrams, everything you need to understand...

07:18 ...what the SDK can do and how you can leverage it.

07:23 Creating add-ins...when you install the SDK, we install a bunch of templates for use...

07:29 ...with Visual Studio so that you don't have to develop...

07:33 ...if you want to build a button that has code in it, you don't have to develop that from scratch.

07:36 You start a button base project, it adds all the references for you, stubs out all the code for you...

07:46 ...and then you just go in and code for the events and deploy it.

07:52 What do you do after you create an add-in?

07:54 Well, you can install it on your machine, you can put it in a shared location...

07:57 ...for everyone that's using ArcGIS Explorer just takes it, or you can share it on arcgis.com.

08:04 You can upload it to the world so that anyone can download your add-in and use it.

08:08 Or, if you create a group in arcgis.com and you control access to who can see the things in that group...

08:16 ...you can share it in the group as well.

08:17 Arcgis.com is not just about sharing with the world, it's sharing with a group that you control.

08:22 And that's a platform that you can use for sharing.

08:26 It provides, in the ArcGIS Explorer options, gives you the option for managing your add-ins.

08:33 You might have lots of buttons and galleries and dockable windows that you can manage...

08:37 ...and it provides an interface for doing that.

08:39 ArcGIS Explorer Desktop team also blogs pretty aggressively.

08:43 They go into details about how developers and users can use ArcGIS Explorer.

08:48 They tell big-picture stories about what people are using with Explorer.

08:52 And if you want to know more details, because this is just...I want to dig in, but I can't.

08:57 But today at 5 p.m. in the Desktop Developer Island, I'll be going through...

09:02 ...configuring and customizing ArcGIS Explorer Desktop, and I'll be digging in...

09:06 ...and actually showing you code, how to configure the application...

09:08 ...how to write add-ins, how to share them on arcgis.com.

09:13 ArcGIS Desktop, of course our flagship professional GIS product, is great for GIS people...

09:21 ...to do spatial analysis, manage data, cartographic output, all that good stuff.

09:25 But there's also a developer angle.

09:29 So the first thing I want to do is create a map with ArcMap.

09:35 I'm going to add a basemap from ArcGIS Online.

09:39 There's a World Streets layer that I want to put in there...

09:42 ...and use that sort of as reference for the rest of the map.

09:47 Then I have a point feature class of customers, some of my customers in downtown Denver.

09:54 In fact, if I zoom in on that layer, it zooms in.

09:59 I can zoom out a little bit if I want.

10:01 And those are some of my customers in downtown Denver.

10:04 And I'm going to go ahead and save that as an MXD or a map document that's sharable and reusable.

10:12 So I can save that on disk.

10:13 I'll go ahead and do that.

10:15 And for those of you who haven't seen ArcMap, that's basically the Hello World of using ArcMap.

10:22 Add a base layer from online, add a point dataset from something that's sitting on my disk...

10:28 ...and then save that map, save the state of that map into something that I can use again.

10:33 So that's create a map, and I'll get back to that one.

10:36 We're going to reuse that one over and over.

10:39 Okay, so ArcGIS Desktop, there are four options for developers.

10:44 There's customization of the UI and its functionality; there's a ArcObjects SDK...

10:50 ...that has thousands of object classes, and over a hundred object model diagrams.

10:56 So we basically expose everything to you that's exposed to us, pretty much.

11:02 But there's also a simpler option of add-ins, just like you can with ArcGIS Explorer.

11:07 We provide add-in templates that you can use to create add-ins.

11:09 And then there's also script tools.

11:12 There's Python scripting that you can use in order to customize the experience.

11:16 So what does customizing the UI look like?

11:18 Well, through the Customize window, there's the Toolbars menu...

11:22 ...and it gives you access to dozens of toolbars that have hundreds of tools.

11:27 You couldn't possibly turn them all on even in a high-resolution screen.

11:31 You wouldn't see the map anymore, you'd see nothing but buttons and tools.

11:34 So this is a great idea if you have a shop of GIS people to really...

11:39 ...just put the toolbars and the tools on there that they need, remove the stuff that they don't need...

11:44 ...and you can lock that down, password protect it so that all your users are using the same interface.

11:50 And you're not coding at all.

11:53 Okay, the next is ArcGIS Desktop...I'm sorry, ArcObjects...

11:58 The ArcObjects API.

11:59 And this is what I was talking about, about all the object models.

12:02 I'm not going to ask you if you can read it from there, because I can't even read it from here.

12:06 But, it just goes to show you that practically everything you can do in ArcGIS...

12:11 ...through the interface and more is exposed through the ArcObjects API.

12:15 Can be daunting, but this API has been around for over 10 years now.

12:20 There are so many samples that we've included and built up over the years...

12:24 ...there are so many applications and samples that the users have created...

12:27 ...and built up over the years, for most, 99.whatever tasks, you really shouldn't...

12:32 ...have to write too much from scratch anymore.

12:35 It's really just a part of picking and choosing what you want to start with...

12:38 ...and then coding from there as a launch point.

12:41 Now if you started with this back at version 8.0, you're basically writing everything from scratch.

12:45 We had no templates and the community really hadn't jumped in yet.

12:50 But a simpler way that started just a couple years ago is creating add-ins.

12:56 And this is a very easy way to deploy...we give you templates in Visual Studio...

13:03 ...you pick the template you want, you code away...

13:06 ...and then you build that thing as what's called an Esri add-in file.

13:10 It's really just a ZIP file.

13:12 But we call it Esri add-in so that our application can recognize that it's part of the system.

13:16 And when you put...and you don't even have to install it.

13:20 There's no registration, there's no install wizard, its really just taking that single file...

13:25 ...dropping it in the default well known location...

13:28 ...or another well known location that you designate on a network share.

13:31 And the next time ArcMap starts up...

13:34 ...it reads those add-ins that are in the well known location and brings it into the system.

13:38 So that ZIP file encapsulates everything that you need.

13:43 Here's what the templates look like in Visual Studio.

13:45 You install the ArcObjects SDK...

13:48 ...you get these templates to create an ArcMap add-in, an ArcCatalog add-in.

13:56 Add-ins doesn't give you as much of an extensive set of possibilities as the ArcObjects API does...

14:04 ...but we do hit center mass on the big bulk of at least 80 percent of what people do.

14:10 You can create toolbars and menus and combo boxes, and create extensions.

14:14 You could do some pretty advanced stuff with add-ins and deploy them and maintain them fairly easily.

14:20 In fact, as a developer, let's say you have the add-in...

14:23 ...in a network share location and your users are working with it.

14:27 You know, at the end of the day, you know, you're coding bug fixes or improvements to your add-in.

14:32 When they leave for the day, all you do is swap out that add-in at that well known location...

14:36 ...and the next time they start up ArcMap the next morning, they get the new tool...

14:40 ...with the new fix or the new, enhanced functionality.

14:42 So it's a nice, simple way to deploy.

14:47 So you can create add-ins, you can bring add-ins into the system this way.

14:52 There's an add-in manager so that you can manage the add-ins more manually if you want to.

15:00 The ArcObjects SDK has a pretty extensive help system...

15:03 ...lots of samples, lots of conceptual help and tutorials as well. Okay?

15:11 So what I'm going to do is I'm going to find and install an add-in.

15:16 And what I want to...and I'm going to go find an add-in that I want and install it.

15:20 Something that was shared.

15:22 So I'm going to start up a web browser and go to arcgis.com...

15:27 ...and search for an add-in that's been shared...

15:29 ...and I'll show you how fairly quick it is to install.

15:40 So let me...I happen to know that there is a tool out there for importing GPX files.

15:46 These are GPS exchange format files.

15:49 And I want to take those points from a GPS device and bring them into ArcMap.

15:53 Well, if I just click the Open button and I open with the Esri add-in file...

15:59 ...it's going to at some point give me an installation wizard.

16:04 And I just say, I'll just take the defaults and go ahead and install the add-in.

16:08 It says that it succeeded.

16:12 And now when I go to ArcMap and I go into the Customize...

16:17 ...into my Customize window, there's a place where all the add-ins will go when the installer

installs them.

16:26 And it's under Commands, and it's going to pop up here soon.

16:31 There's my add-in controls, and there's my GPX import.

16:35 So at that point, all I have to do is drag it and drop it onto the toolbar, and I can use that GPX importer.

16:42 Asks me to navigate to the GPX file, imports it as a point layer.

16:48 So if you share things on arcgis.com, others can download it and install it almost as easily, okay?

16:57 Next is ArcGIS Engine.

17:00 ArcGIS Engine is sort of like ArcGIS Desktop, except it's only components, there is no interface.

17:05 It's just all of the controls that ArcGIS...or most of the controls...

17:10 ...that ArcGIS Desktop uses plus the entire same access to ArcObjects API.

17:19 And oh, let me see...And so as you can see, I'm totally within Visual Studio.

17:26 There's thousands of classes, over a dozen controls.

17:30 And this is when you want to create and compile...

17:33 ...and deploy stand-alone applications using Windows or Java.

17:38 I'm going to go with Windows here.

17:40 I'm in Visual Studio.

17:42 I'm going to create a brand new project.

17:45 And when you install the SDK, you get all of these templates that you can choose from.

17:49 I'm just going to choose a Windows application using ArcGIS Engine, and click OK.

17:54 And this is what's going to be included by the wizard.

17:58 And let's say I want to go ahead and use an Engine license...

18:02 ...and default to an ArcInfo license, use the Network Analyst extension.

18:07 So I pick which licenses and which extensions I want to use, and the install wizard...

18:11 ...will add all the references, add all the dependencies, and stub out all of the code...

18:17 ...that I need in order for my project to get a really nice kick start.

18:23 Okay, so a lot of the code was there, and now I'm going to...

18:28 ...once the wizard is done, I'm going to go ahead and add a map control.

18:41 I'm going to add a map control to the form, and also the table of contents control.

18:49 Once it comes back...and also a toolbar control.

18:54 And show you the hundreds of tools that you can...

18:57 ...I'm not going to put hundreds of tools on there, but...

19:00 ...come on, come back to me...Okay, alright.

19:20 It can do it, now it's not going to do it.

19:24 Alright, there's my map control.

19:26 Okay, now I want a license control in order to control the license that the application will use at runtime.

19:37 Oh, there it is. Oh, I have two license controls, I don't want that.

19:44 Alright, so the license control is going to let me use an ArcInfo license or an ArcGIS Engine license...

19:50 ...and now I'm going to add the table of contents control, and the toolbar control.

19:59 Alright, now, my map control, I could do this programmatically by code...

20:05 ...but I'm going to add the map document that I just created a couple minutes ago.

20:10 And it's reading the local data, it's reading across to and checking out the layer...

20:16 ...that's coming across from ArcGIS Online, making sure everything looks good...

20:25 Alright, and then I hit OK.

20:28 And now, the next thing I want to do is take this table of contents control...

20:31 ...and make it a buddy of the map control.

20:35 And same thing with the toolbar control.

20:37 Now all three of these controls are bound together.

20:40 You don't have to write the code that binds them.

20:42 They're all now bound together.

20:43 Now if I go the toolbar, what do I want?

20:45 Well, I want to add some tools for my user.

20:49 And like I said, there's dozens of toolbars and hundreds and hundreds of tools to choose from.

20:53 I'm just going to go real simple.

[20:55](#) I want a zoom-in box, I want a zoom-out box, I want a full extent, and a pan.

[21:04](#) It doesn't get more hello-world than this, folks.

[21:09](#) And now I'm going to fire that bad boy up...

[21:12](#) ...and I'm going to show you what this application looks like.

[21:17](#) Alright, and so it's easy to get started.

[21:22](#) We used to have a product years ago called MapObjects.

[21:26](#) And it was a great product, I loved it.

[21:27](#) But everything you had to do, every little thing you had to do, you had to code.

[21:31](#) So when ArcGIS Engine came out, people were daunted by the 20 times sheer size of the SDK...

[21:38](#) ...and thinking it was going to be so much harder to use.

[21:41](#) But what they didn't realize is that there are hundreds of tools that are already prebuilt for you...

[21:48](#) ...that handle most of the applications...handle most of the stuff that you would want to do.

[21:52](#) So Voilà! I've just created the smallest GIS application in the world.

[21:58](#) And I have to go to UI design school.

[22:01](#) So there you go.

[22:02](#) That's pretty quick, and at least to get started.

[22:07](#) So that's Engine.

[22:09](#) So, but what if you're a new programmer?

[22:10](#) How do you get started with Visual Studio?

[22:14](#) Well the express editions of Visual Studio are free, and you can create add-ins with the express edition.

[22:20](#) And then there's lots of online training, there's beginners books that you'd see at Borders and stuff.

[22:24](#) I recommend those for the basics of data types and conditions and looping and things like that.

[22:30](#) But the MSDN site also has lots of tutorials and videos and sample code.

[22:34](#) And then, if you're like me, you're like...when you're using a technology, you say, Where's the community?

[22:40](#) Well, the community for Visual Studio, here's just a couple.

[22:42](#) But there's lots and lots of them.

[22:44](#) Here's two that I like at least for Visual Basic...

[22:47](#) ...when I'm hacking around, is vbforms.com and extremevbtalk.com.

[22:50](#) These are very, very active.

[22:52](#) And lots of times when I have a problem or a question, I just search the site...

[22:56](#) ...and find the answer because chances are I'm not the first one that hit it.

[22:59](#) But if I did, I just post it...there's lots of people out there are just itching to jump in...

[23:03](#) ...and help you solve your problem.

[23:05](#) So jump into the community when you can.

[23:07](#) Geoprocessing, what are your options?

[23:09](#) Well, we provide a Python scripting language...

[23:11](#) ...and you can create add-ins and geoprocessing packages with it.

[23:17](#) And there's lots of conceptual help and sample help on the Resource Center.

[23:23](#) So let's go back to that ArcMap application.

[23:27](#) And I have that point layer of my customers.

[23:30](#) And what I can do before I even deploy a tool...

[23:33](#) ...I can do some interactive Python right here in the Python window.

[23:38](#) So I have my customer 3 layer, I want my output layer to...let's just call that output 99.

[23:47](#) What distance do I want to buffer these points?

[23:49](#) Let's go with 750 feet.

[23:51](#) Notice how I'm using that very naturally.

[23:53](#) 750 feet in quotes.

[23:56](#) And then it's got some additional options, I want them fully buffered.

[24:01](#) I want the ends to be flat, which they're not going to be, because they're not lines.

[24:05](#) I'll go ahead with all I want to dissolve.

[24:10](#) I want all of the buffers to be dissolved if they intersect with one another.

[24:14](#) And I'll let that run for a little bit.

[24:16](#) And if you noticed, as I was typing there was an auto code complete, it was giving me the

options...

[24:21](#) ...and the methods and the arguments in the drop-down.

[24:24](#) There was also a lot of help that was occurring over here in the right-hand side...

[24:27](#) ...so I don't have to keep going back and forth to the documentation.

[24:30](#) And it went ahead and it buffered all my points by 750 feet, it dissolved them together...

[24:34](#) ...because that's what I told it to do, and now I have a polygon layer that I can use for subsequent analysis.

[24:41](#) So that's...and, when I'm writing in Python, I can save that as a tool.

[24:47](#) I can save that to the toolbox.

[24:48](#) And if I want, I can put that on the interface for people to run.

[24:53](#) And then Andy's going to show you how you can even take that Python script...

[24:56](#) ...and publish it as a geoprocessing service so that web and mobile clients can hit it as well.

[25:03](#) Okay? So I hope...Okay, how do you get started with Python if you haven't touched it before?

[25:11](#) Start with Python.org.

[25:13](#) It's a great resource.

[25:15](#) Lot of doc, lot of samples, tutorials, and the community is there as well.

[25:20](#) Of course, there's lots of books and lots of training out there on Python, but I recommend you start here.

[25:25](#) Geodatabase, what are your options?

[25:27](#) You have three.

[25:28](#) As I showed you with Engine, you have all these tools.

[25:32](#) Well, there's lots of editing tools in there too.

[25:34](#) There's a lot of data management tools in there that you can drag onto the toolbar.

[25:37](#) So there are components that are already written that you can leverage...

[25:40](#) ...into your applications without writing much code.

[25:43](#) There's also the geodatabase object model.

[25:46](#) Remember, I described the huge ArcObjects object model.

[25:48](#) Geodatabase is just one of those parts that gives you pretty much full access to the geodatabase.

[25:54](#) You can break as much as you want.

[25:58](#) That's what I do.

[25:59](#) And then, relatively new is the file geodatabase API.

[26:10](#) This is a freely released API you can read and write file geodatabases without needing ArcGIS at all.

[26:19](#) So anyone who doesn't even have Esri technology at all can download this file geodatabase API...

[26:25](#) ...and read and write file geodatabases whether they want to use it for exchange...

[26:26](#) ...whether they want to use it as a part of their application, or maybe the error applications...

[26:32](#) ...output or input needs to interact with an organization that has ArcGIS...

[26:36](#) There's lots of options, and you can use it on Windows or on Linux.

[26:40](#) So next, Andy...Andy's going to take you through client/server...

[26:44](#) ...and the whole web and mobile side of this landscape.

[26:50](#) Thanks, Jim.

[26:52](#) We'll see if I can click this on and it will actually stay.

[26:58](#) Can you hear me now?

[27:01](#) In the back?

[27:03](#) Alright, ArcGIS Server.

[27:07](#) It does help if we switch screens.

[27:11](#) Minus two points, right?

[27:14](#) We're just striking out on this little clip here.

[27:17](#) Whoever invented it needs to...we need to get our money back.

[27:21](#) Alright, I think that's going to stay.

[27:25](#) Alright, ArcGIS Server.

[27:27](#) ArcGIS Server is really the heart of the system that we're talking about.

[27:31](#) And so what I'm going to do is give you an overview from an architecture perspective...

[27:36](#) ...let you know what all the pieces are, and I'm going to talk about the APIs...

[27:40](#) ...and the services that make up this architecture.

[27:43](#) I'm going to liberally sprinkle some demos in there for you to keep your interest...

[27:47](#) ...and at the very end I'm just going to give you a very quick...

[27:50](#) ...high-level audit of some getting started suggestions.

[27:53](#) I do want to let you know that I'm going to cover a lot of material.

[27:57](#) If you don't have a chance to write down some of the links and shortcuts that I provided for you...

[28:02](#) ...they're available in the PowerPoint after the session is done and when they're posted up on esri.com.

[28:11](#) There. It's probably a little bit better to see when it's in presentation mode.

[28:15](#) ArcGIS Server is a system that lets you work with many clients.

[28:20](#) And like I said, ArcGIS Server is really at the heart of this system.

[28:24](#) ArcGIS Desktop is a client of ArcGIS Server, ArcGIS Explorer is also a client...

[28:29](#) ...and many more as you can see there.

[28:32](#) And that's the real power, is because you can take your data and you can use ArcGIS Server...

[28:37](#) ...to collaborate and to share your information publicly or even within your peer group on projects.

[28:46](#) So just to show you a few examples in addition to what you may have already seen...

[28:50](#) ...this week and in the plenary, and tell you which API was used to build these applications...

[28:55](#) ...on some of the capabilities that you can do, this is a crime map for the City of San Francisco.

[29:00](#) It's using the Silverlight API.

[29:03](#) You can look at the information on crime on a time basis, you can create client-side hot spots.

[29:11](#) It's an algorithm that exists on the client application that enables you to tell...

[29:16](#) ...areas where there's higher amounts of crime.

[29:18](#) So where there's more crime you'll see red, where there's less crime you'll see blue.

[29:22](#) This information is a library that we were able to pull into the Silverlight application...

[29:28](#) ...so that people can look at this and make better decisions about where crime is happening.

[29:33](#) This application is also built with the Silverlight API.

[29:36](#) It was tracking in near real time a young boy that summited on Everest...

[29:41](#) ...and we were able to incorporate social media, we were able to bring his points and his tracks...

[29:46](#) ...into ArcGIS Server so that people around the world could track his progress.

29:50 We also threw in some geoprocessing which Jim was talking about.

29:54 So on a daily basis, we knew not only how far he went, but you could see the elevation...

29:59 ...on what they gained or lost on that particular day.

30:04 This application was built with the JavaScript API.

30:07 It's bringing in real-time flood information and real-time radar.

30:12 And this is mainly just to give you an idea that it's not just ArcGIS Server information...

30:17 ...that you can bring into these applications.

30:19 It's other information that's published by other people...

30:21 ...like you and other services around the country or the world.

30:26 This application, City of Greeley, built with the Silverlight API, it's a tax parcel map.

30:32 Not only do you have rooftop information, but you also have fire hydrant information...

30:37 ...water and sewer information, and much, much more.

30:40 And the Silverlight API as well as our other APIs...

30:43 ...give you the framework on which to build these things.

30:46 I just threw this one in there because it's beautiful cartography.

30:50 This was built as a custom layer.

30:52 And if you have custom mapping information and you want to integrate it...

30:55 ...into your map, this tax parcel map for the...I want to say the City of Boulder...

31:01 ...for the County of Boulder...it's a beautiful presentation, one of the best I've seen.

31:08 Hopefully, now you're wondering, you've seen these applications, what point am I trying to make?

31:14 What's going on behind the scenes and how does this stuff work?

31:17 And if I can emphasize anything, your data is at the heart of this system.

31:22 And as Jim was talking about, your data could be a shapefile, it could be a CSV file...

31:27 ...it could be a geodatabase or a file geodatabase.

31:30 What ArcGIS Server does, is it gives you the framework to take your data...

31:35 ...and make it available to other people to collaborate with.

31:38 And the way we do that is we create what we call GIS services.

31:41 And those are function-specific.

31:44 So if you have mapping data in your geodatabase and you want to share it with someone...

31:49 ...you can use what we call a mapping service, and so on.

31:53 Geoprocessing, querying, there's many others that I'll get into in just a minute.

31:59 Web services is how that data in the GIS services is manipulated.

32:05 And we have three.

32:06 We have REST, SOAP, and OGC.

32:09 And throughout the week, you may have heard of WMS, web mapping services...

32:13 ...WFS, web feature services...those are all OGC.

32:17 And we also have a SOAP, API in ArcGIS 10.

32:23 Client APIs let us wrap the web services so we don't have to do much work.

32:28 And we have four of those, four different types available.

32:32 We have mobile, JavaScript, Flex, and Silverlight.

32:39 If you didn't write those down, I'll have another slide in just a minute.

32:43 What is a GIS service?

32:45 Remember, I said if you have data in your database and you want to share it with someone...

32:50 ...the GIS service enables your customers, your clients, your colleagues...

32:55 ...or your users to edit, use, and display your data.

33:00 That is all a GIS service is.

33:02 And there's many different types, depending on what type of data you have...

33:06 ...and how you want to deploy it.

33:09 Pretty straightforward.

33:11 There's lots of them depending on exactly what you want to do.

33:16 I mentioned mapping, there's feature services...you may have heard us talk about that this week.

33:20 Geoprocessing, which Jim already talked about, search, imaging, geodata.

33:25 Lots of these services are available...

33:27 If you go to the shortcut URL that I provided, it talks about when you're in Desktop...

33:33 ...how you can publish these services in ArcGIS Server.

33:37 That shortcut URL is esriurl.com/arcgisservices.

33:44 And again, if you don't have time to get these while I'm presenting...

33:48 ...they'll be provided to you after the conference.

33:51 So how does all this start?

33:54 Where does all this begin?

33:56 And it really begins with Desktop.

33:58 And the only way to get your service published...

34:02 ...is either through Desktop or someone's already published it on the Internet.

34:07 So what I want to show you here is, I have the same data that Jim was showing you earlier.

34:12 And what I have is my customer information as a point layer around the City and County of Denver.

34:17 And I also have some census tracts for the same area.

34:21 And what I want to do is be able to publish this as a web service so that near the end of my presentation...

34:28 ...I'm going to consume that in a web app.

34:31 These are my points, it's my custom data, and I want to be able to serve that.

34:35 So how do I do that?

34:39 Now, I've cheated a little bit, and I already have ArcGIS Server installed...

34:44 ...and I'm not going to talk about how to install ArcGIS Server.

34:47 But once you have it installed, in Catalog in ArcGIS Desktop, I'm simply right-clicking...

34:54 ...on my MXD, and there's an option that says, Publish to ArcGIS Server.

35:01 Now for the purposes of time, I'm not going to walk you through all the defaults...

35:04 ...but if you do click through all the defaults and just say Yes, Yes, Yes, the end result...

35:09 ...is under your GIS Servers tab in Catalog, you should get a service that pops up.

35:18 And when it pops up, you should see the Start button grayed out.

35:22 This is the first indication, Yay, I was successful, I was able to publish this service.

35:27 But that's not all! What you need to do after you're done with this is...

35:34 ...you're going to go into a web browser and you're going to go to what's called the REST

endpoint.

35:40 And this pattern that I'm showing you is very important.

35:43 It's going to be the name of your machine and, in this case, I have ArcGIS Server...

35:47 ...installed on my laptop /arcgis/REST/services.

35:53 And that pattern should always be very similar.

35:56 And what you're going to see is the service that you published.

35:59 And what this REST endpoint is, is it's just a dictionary that ArcGIS Server creates...

36:05 ...that says, here's the information, here's all your services.

36:08 But you can drill down into these services.

36:12 And my server is cold so it's going to take just a second to connect to it.

36:17 You can drill down into these services and you'll see here...

36:20 ...in just a second that there is a lot more information available.

36:25 There we go, it's loaded.

36:27 And you can see here, here's my two layers...

36:30 ...here's my customer info layer that I borrowed from Jim.

36:33 Here's my census tracts, here's my spatial reference...very important.

36:40 And I want to point out a couple of last things for you down here at the bottom.

36:46 Remember my slide? I said, How do we access this information?

36:49 This particular service that I published is available through both REST and SOAP.

36:54 Very good, because I'm going to be using REST...

36:56 ...in my JavaScript application that I'm going to show you in just a couple minutes.

37:01 And you can see here the different types of things that I can do against this service.

37:06 I can view it as a map, I can run an identify process against it, Find, and I can also generate KML.

37:15 But what I'm going to do is just click on Show Me the Map.

37:20 And what this is, is this is my final test to make sure that that REST endpoint really works.

37:25 And you can see here, I can see my points and my census tract data.

37:29 Yes, everything was successful.

37:31 The last thing I need to do is build that into my application.

37:36 It's pretty straightforward so far, right? Pretty cool. Alright.

37:46 We talked about these, how do I get the data in REST, SOAP, and OGC?

37:52 These are behind-the-scenes frameworks that are letting you access that data.

37:57 And if you look at when I ran this page, this application that's built into ArcGIS Server...

38:08 ...you'll notice something very interesting in the URL.

38:11 And what REST is, it's a URL-based interface.

38:15 And you see there where it says Export, and a question mark, and BBox...

38:19 ...which stands for bounding box, this is the reason why people like REST-based interface...

38:25 ...because they're very easy to manipulate.

38:33 The way the REST architecture works.

38:36 So what you just saw, and this is just a recap, is I took an MXD...

38:40 ...I took the data that Jim gave me, I published it to ArcGIS Server...

38:44 ...and it went into the geodatabase, it was available on my web server.

38:49 That application that's built into the ArcGIS Server REST endpoint...

38:53 ...remember I clicked on Export Map?

38:55 What that did is that that made a REST request, which looks just like a URL...

39:00 ...it made a request of the server, the server did something...

39:04 ...and it sent me some information back where it says JSON right there.

39:09 And what JSON is, JSON means JavaScript Object Notation.

39:14 And there's a lot of information that comes back...

39:17 ...and I'll show you an example of what that looks like in just a second.

39:21 So this is the request that's going out.

39:24 It looks just like a URL.

39:25 Pretty straightforward, right?

39:27 And what I can do is, I can take that URL, I can copy and paste it...

39:31 ...put it in my browser, and information is going to come back.

39:34 And I proved that to you when I was at the REST endpoint.

39:41 So let's take a step back for just a second.

39:45 We have some web APIs that let you manipulate the REST endpoints.

39:50 And the Web APIs that we have are JavaScript; we have JavaScript compact...

39:55 ...which is specifically built for Mobile, it's the much lighter weight library...

39:59 ...that you download to the browser; we also have...

40:01 ...Adobe Flex; and we have Microsoft Silverlight/Windows Presentation Foundation.

40:08 And people always asks us, Great, that's lots of choices, but where do I start?

40:13 If you're a new developer and you're not familiar with these...

40:16 ...I recommend that you start with JavaScript.

40:18 It's much easier to get going, there's millions of samples.

40:22 In order to develop on it, really all you need is a Notepad or Notepad++ to get going.

40:28 If you're an experienced developer, I know there's quite a few experienced developers in here...

40:33 Go with what you're comfortable with, go with what your team skill set is...

40:37 ...or go with which one of these APIs matches your requirements the best.

40:43 So maybe you're thinking well, you told me about a REST API and you told me about a web API.

40:50 Now, which one do I use?

40:52 I'm kind of confused, perhaps.

40:56 The nice thing about the web APIs is they wrap...

40:59 ...they handle all of the web requests for you behind the scenes.

41:03 The web APIs you can use a very simple syntax to make the request.

41:08 And here I'm showing you a pattern where it says `map.add.layer = some basemap`.

41:14 In comparison, if I wanted to use the REST API...and this is going on behind the scenes...

41:19 ...that's how we're communicating with ArcGIS Server.

41:21 I would have to add parameters to this endpoint and it could get very tedious.

41:26 The web APIs take a lot of that complexity away from you...

41:30 ...and it makes it much easier for you to build applications faster.

41:34 And that's not all.

41:36 The bonus is, remember in that diagram I showed you we were making a request...

41:40 ...to ArcGIS Server and information's coming back?

41:42 It's called the JSON payload?

41:45 You can use the REST API if you want to, but you're going to have to do something...

41:50 ...with this information that's coming back.

41:52 This JavaScript Object Notation stuff.

41:55 In comparison, within the web API, all I have to do is...

41:59 ...a single line of code to make this stuff display on my map.

42:03 So what I just showed you is that first line, is I make the request to the server...

42:07 ...one line of code, and the information comes back, one line of code.

42:12 And what happened behind the scenes was this REST request...

42:15 ...that's manipulating the GIS services against my map service data.

42:23 That's a lot of information, right?

42:26 But the one thing to remember is, those web APIs are making your life a lot easier.

42:33 Lots of capabilities inside the web APIs...queries, maps.

42:38 You've probably heard about all this stuff all this week.

42:40 Feature layers, time awareness, editing, and extents.

42:45 The web APIs are very powerful so that even if your project is adding points to the map...

42:50 ...or simple polygons, as your needs grow, the capabilities are within these APIs to help you out...

42:58 ...and make your life so much easier so you don't have to build this functionality by hand.

43:04 The web APIs also give you a tremendous framework for integrating multiple services.

43:10 I proved that to you, for example, when I showed you the JavaScript application...

43:14 ...that brought in real-time floodgate data.

43:18 And real-time radar information.

43:20 You don't have to build this framework by hand.

43:23 The framework is already built into the APIs so that you can display a basemap...

43:29 ...with parcel information on top of it or any other custom data.

[43:32](#) Like that beautiful cartography that I showed you for Boulder County.

[43:36](#) You can do that, and it's just a few lines of code.

[43:39](#) And that's the real power of the web APIs.

[43:44](#) You may have already heard, and I've used and referred to things such as syntax.

[43:51](#) And I mainly just want to impress upon you as you go throughout your other sessions...

[43:56](#) ...even if you're in a session where they're talking about a different language...

[43:59](#) ...that you know or you're new to a programming language, syntax is just like how we speak.

[44:04](#) If I say hola to you, it also means hello. We say different things in the different languages.

[44:10](#) As long as you understand the concept...

[44:13](#) ...you can at least figure out how these particular things are working.

[44:17](#) And it's just something to keep in mind as you go throughout the week.

[44:21](#) We also talk about patterns.

[44:23](#) And if there's one takeaway you have from this session, if you can understand the patterns...

[44:30](#) ...that are behind the APIs, you can apply that to any situation.

[44:34](#) It can solve your problems, and even if you can't get something to work...

[44:38](#) ...and you go back and you look at our Resource Center documentation...

[44:42](#) ...which is in resources.arcgis.com, that pattern will help you.

[44:46](#) And this particular pattern that I'm showing here that I'll demonstrate is a five-step pattern...

[44:52](#) ...that's very common throughout all of our APIs.

[44:55](#) Because even though the syntax is different, we're accomplishing the same thing.

[45:00](#) In this pattern, we're defining a query task...

[45:03](#) ...which is, I want to get information out of my geodatabase.

[45:07](#) The next...Step Two is saying, When that's done...

[45:10](#) ...because remember, I'm sending a request to Server, and something's coming back.

[45:14](#) When it's done, I need to tell it do something.

[45:16](#) I'm going to assign it what we call some properties, and then I always have to tell it to execute.

[45:23](#) And execute is going to happen when someone clicks on the map, or someone clicks on the button.

[45:29](#) And when it's done, up in Step Two, I'm going to do something with that information.

[45:35](#) And these patterns, and this is just one example of the many that we have...

[45:39](#) ...if you just remember that there's a pattern to it you can always go back and troubleshoot...

[45:44](#) ...or you can remember the pattern and build your applications faster.

[45:49](#) So let's take a look at what this looks like.

[45:53](#) Alright, so this particular application, remember I said I wanted to consume my custom points...

[45:58](#) ...and my county boundaries that Jim gave me?

[46:01](#) So what I'm going to do in this particular application...can you see it better?

[46:07](#) What I'm going to do in this particular application is, this pattern should look familiar, right?

[46:12](#) I'm adding my basemap, which is a street map.

[46:16](#) I'm adding my custom layer that I just published from Desktop.

[46:21](#) And like Jim said, I also added a geoprocesser service here.

[46:27](#) And the pattern that all this stuff follows is, here's the pattern.

[46:33](#) What do I do when my map loads?

[46:35](#) Well, I run all this information here.

[46:38](#) And I have another pattern in here that I want to use.

[46:41](#) I want to be able to identify a census tract...I almost said tax parcel.

[46:47](#) I want to be able to identify a census tract, and if you look at this, even if you don't understand it...

[46:52](#) ...that five-step pattern that I just showed you is there.

[46:55](#) I'm saying I want to be able to identify something, I'm assigning it some properties...

[47:00](#) ...and see down here I'm saying, when it's done, go ahead and execute it...

[47:06](#) ...and then I'm going to simply project that on a map in a pop-up window.

[47:11](#) But that's not all.

[47:13](#) Also built into this application, I'm following the same pattern again...

[47:18](#) ...when I'm running a geoprocessing service.

[47:22](#) You're seeing the pattern again here.

[47:24](#) I have some features and I'm telling it to execute this geoprocessing task.

[47:30](#) And then when it's done, I'm going to run that function that says Get Drive Time Polys...

[47:35](#) ...and I'm going to display that on the map.

[47:37](#) And that's why these patterns are so very powerful.

[47:41](#) So let's look at what that looks like when we actually run it in an application.

[47:45](#) Ha! I cheated there.

[47:47](#) Alright, so it's actually loaded here.

[47:51](#) And just to prove to you that this is live and running on my machine, you can see here...

[47:56](#) ...this is running that Identify task that I programmed into my application.

[48:00](#) When I click on it, it's executing the Identify task, it's running this query...

[48:06](#) ...behind the scenes and returning me this information that I asked for, which is population.

[48:11](#) I can also click on my points.

[48:14](#) This is the point layer that I had in Desktop.

[48:16](#) That information is being processed through that Identify task in my code.

[48:21](#) And I can also run this geoprocessing service.

[48:25](#) And I was calling that Drive Times.

[48:26](#) And remember, I said there's a trigger...

[48:28](#) ...when you want to run one of these functions...these services.

[48:33](#) And in this case, I click on Drive Times.

[48:35](#) Now, when I click on my map, it's going to go out to ArcGIS Server...

[48:41](#) ...and it's running this geoprocessing task.

[48:47](#) The main takeaway for this is, follow the patterns, the patterns are there in the documentation...

[48:53](#) ...and they provide you with some very powerful toolsets...

[48:55](#) ...that you can build very quickly within these applications. Cool, right?

[49:02](#) Still with me? Yep.

[49:07](#) Alright, if you want to make your life easier...

[49:09](#) ...you're thinking, Oh, my God, I have to build everything from scratch.

[49:12](#) We have some extendable solutions that you can use out of the box...

[49:15](#) ...and you've already seen some of them this week.

[49:18](#) The ArcGIS Viewer for Flex...again, I know that there's no hyperlink there.

[49:22](#) It'll be available in the PowerPoint after the conference, or you can go to resources.arcgis.com.

[49:29](#) We have Silverlight templates for you .NET developers...

[49:32](#) ...we also have a Silverlight toolkit which has things such as the magnifying glass...

[49:37](#) ...that you can move on the map.

[49:38](#) We also have ArcGIS Mapping for SharePoint.

[49:41](#) The whole idea behind these extendable solutions and, in particular, the ArcGIS Viewer for Flex...

[49:48](#) ...is you can get the source code and you get functionality that's going to give you a huge kick start.

[49:53](#) And if all else fails, even if it doesn't give you a kick start you can go in there and look at some of the patterns...

[49:59](#) ...that they use to do some of the functionality that you think is cool...

[50:02](#) ...or you need for your particular project.

[50:06](#) Whew! Alright, that was web GIS.

[50:14](#) I'm going to switch gears to mobile GIS.

[50:15](#) I just wanted to prepare you, context shifting.

[50:19](#) Mobile GIS...we have two different categories of our APIs...

[50:26](#) ...and developer offerings for mobile GIS.

[50:28](#) We have ruggedized devices, which includes ArcGIS Mobile and ArcPad...

[50:33](#) ...and we have smartphones.

[50:35](#) I bet...how many of you in here have smartphones?

[50:39](#) And those of you who don't you don't have to be ashamed.

[50:41](#) Almost everybody.

[50:42](#) We have iOS, Windows Phone, and Android.

[50:46](#) All of the major flavors.

[50:49](#) Our API for smartphones are specifically designed for touch-based interfaces...

[50:54](#) ...because that's how you're using these.

[50:56](#) Some of them have keyboards...

[50:57](#) ...but I'm guessing most of the time you're using a touch-based interface.

[51:00](#) So the workflows, or the way that you use these phones, is much different...

[51:05](#) ...than the way that you would build any other application.

[51:08](#) These are primarily designed to work in what's called an assisted GPS environment.

[51:15](#) So the GPS, you may have noticed sometimes, that depending on which application you're using...

[51:19](#) ...it has a big circle that says you're within a couple miles, sometimes it's within 50 to 100 feet.

[51:25](#) But it's not super accurate.

[51:27](#) Most commonly, these are used in instances such as emergency operation...

[51:38](#) The ArcGIS API for iPhone, iOS, is a native Objective-C programming language.

[51:45](#) It's using the REST interface that we just looked at a few minutes ago.

[51:50](#) It does require a Mac.

[51:52](#) So if you're planning on doing iOS development, you're going to need to get a Mac.

[51:57](#) And if you to see how this application works, you can download the application today...

[52:01](#) ...off of iTunes and just search for ArcGIS for iOS.

[52:07](#) ArcGIS for Windows Phone is using a C Sharp Silverlight API...

[52:12](#) ...so you .NET developers should feel very at home.

[52:15](#) It's integrated into Visual Studio 2010.

[52:17](#) It's also REST-based, which is really convenient.

[52:21](#) And if you want to see how this application works on your phone...

[52:24](#) ...you can download the ArcGIS Windows Phone application.

[52:27](#) You can get that off the Resource Center.

[52:33](#) Android, native Java API, so if you're a Java developer, this is the way to go.

[52:41](#) The nice thing about Android is, you'll be able to develop applications for it on Windows...

[52:47](#) ...in Linux, and on Mac boxes. It's very flexible in that respect.

[52:52](#) So if you want to get involved in that, see what other people are saying...

[52:53](#) It also runs on many devices.

[52:56](#) For those of you that do have Androids...

[52:58](#) ...you may have noticed that there's many different shapes, sizes, manufacturers.

[53:03](#) Android also comes as an Eclipse plug-in.

[53:06](#) If you're using Eclipse again, that'll be very natural for you.

[53:12](#) The last thing I want to mention on Android is, ArcGIS API for Android is currently in public beta...

[53:17](#) ...so if you're not participating in the program and you're interested in doing Android development work...

[53:23](#) ...make sure you get on board with that.

[53:24](#) And that information is on the Resource Centers.

[53:27](#) ArcGIS for rugged devices.

[53:31](#) Designed for harsh field conditions.

[53:34](#) And again, which API you're using depends on the requirements for your particular application.

[53:40](#) This is for high-accuracy data collection.

[53:43](#) And one of the most common, one of the best examples I know of...

[53:47](#) ...is if you're standing in the middle of an intersection and you have three or four manhole covers...

[53:53](#) ...you need to have a very accurate GPS...

[53:56](#) ...to know which one of the those manhole covers you need to go down and service.

[53:59](#) Or if you need to enter that into your application and update the GIS database.

[54:09](#) The ArcGIS Mobile SDK is built on the older versions of the Microsoft operating system for Mobile.

[54:17](#) It's a .NET API specifically for Windows Mobile 5 and Windows Mobile 6...

[54:23](#) ...as well as the pocket PC .NET compact framework.

[54:27](#) So if you have requirements that run on these ruggedized devices...

[54:32](#) ...then you're going to need to use the ArcGIS Mobile SDK.

[54:39](#) And it's specifically designed to run in connected and disconnected environments.

[54:44](#) ArcPad is specifically designed to run in disconnected environments.

[54:49](#) It's for extremely accurate field data collection.

54:53 And the example I just gave you is very applicable to this type of device.

54:57 You want to know which manhole you're going down, or if you're sending some field workers out...

55:02 ...with the ArcPad device, you want to make sure that they're going down into the right manhole cover.

55:08 It uses .NET and it's an XML-based interface that you can manipulate through a UI designer.

55:19 As I wrap up, I want to impress upon you that building applications for mobile...

55:25 ...is much, much different than building applications on the web.

55:29 And just a few suggestions for you to consider as you leave the session...

55:33 ...and you're thinking about this throughout the rest of the week.

55:36 Much smaller screens...you can't take a fully loaded, fully functional...

55:41 ...command and control web application and expect to squeeze it onto a tiny screen.

55:45 Think about very focused web applications.

55:48 These phones have different workflows than you would use...

55:51 ...when you're sitting at your desktop with your 19- or 20-inch screen.

55:55 They have inconsistent interconnections, slower processors...

55:59 ...the battery life is potentially more limited.

56:02 These are just some takeaways for you to think about, because you're seeing...

56:05 ...a lot of web applications, but mobile is a much different environment.

56:13 Last but not least, I'm going to go through these pretty quick.

56:16 If you miss something, come up afterwards or grab the PowerPoints later.

56:21 And what I'm going to do as I wrap up here is just throw out some ideas...

56:24 ...if you're getting started on these web APIs and just hit some of the highlights.

56:29 Training, if you're interested in the Adobe Flex API, Flex.org is a great place to go.

56:35 They have videos that I think are some of the best that I've seen on the Internet.

56:48 Getting started with JavaScript, dojotoolkit.org...In our JavaScript API, we use the dojo engine.

56:56 That's a great place to go for information on what's in the interface.

57:00 Tutorials, W3Schools.com, many examples.

57:06 They also have applications in there where you can change different things...

[57:11](#) ...in JavaScript and see what the results look like in real time.

[57:14](#) And I always suggest that to people as a starting point.

[57:17](#) A great community for dojo at dojotoolkit.org/community.

[57:22](#) JavaScript, basically all you have to do for JavaScript is, there's a million samples out there.

[57:26](#) Just search for what you're looking for and you're going to hit something very quickly.

[57:33](#) If you're building on Silverlight, Silverlight.net is the place...

[57:37](#) ...to get the plug-ins, the place to find information for the SDK.

[57:42](#) The online resources for Silverlight are available at msdn.microsoft.com.

[57:48](#) That would be the online documentation.

[57:50](#) And there's a great community at Silverlight.NET.

[57:55](#) ...or ask Silverlight-related questions, that's a great place to go.

[58:00](#) Getting started with Android, developer.android.com is the place to go.

[58:06](#) For the vast majority of stuff on there, especially if you're getting started...

[58:11](#) ...Google and Android has done a fantastic job at documenting the functionality in that API.

[58:16](#) They have lots of samples and it's a great place to go.

[58:22](#) iOS, developer.apple.com, that would be what I write down if you're interested in iOS.

[58:30](#) And I can't stress more, if you're going to be doing mobile web development...

[58:34](#) ...make sure that you have a mobile phone that you're going to be testing on.

[58:38](#) Simply just using the emulators in these SDKs isn't going to be enough.

[58:42](#) You really want, in the end, to test it on one of these phones...

[58:46](#) ...before you release it out into the wild.

[58:50](#) Windows Phone, App Hub.

[58:53](#) Looks like it's spelled there.

[58:55](#) App Hub is the place to go if you're interested in Windows Phone development.

[59:00](#) And I hope you found that section interesting.

[59:02](#) That's all I've got.

[59:04](#) I've got a few more things here...

[59:07](#) I'll turn it over to Jim to wrap it up.

59:10 Resource Center is the place to go to get started with...

59:14 ...not only for all the user stuff and ArcGIS, but all of the developer content.

59:20 We touched on some of it already, I'll touch on some more real quick.

59:23 It gives you focused access.

59:27 Every product or area of ArcGIS has its own resource center...

59:30 ...where we give you focused access to those resources, like the Help.

59:34 Here's the geoprocessing, conceptual help, detailed help, Python scripting help.

59:39 ActionScript.org is the perfect place to go if you're interested in the ActionScript/Flex Flash community.

59:40 The JavaScript Resource Center is great because it has hundreds of runnable code that exercises...

59:48 ...most of the basic functionality that you can copy and paste and run with.

59:52 In fact, I met a gentleman a couple weeks ago in South Carolina...

59:56 ...who built...used the JavaScript API to build a website for his city.

1:00:01 And it looked like a lot of the stuff came right from the help.

1:00:05 I asked him what percentage of that application came from the help.

1:00:09 He said about 97 percent of it was just copy, paste from the help, and he just adjusted some paths.

1:00:15 At least to get started.

1:00:16 He wants to do more with it, but at least it's something that can get up and running pretty quickly.

1:00:20 Silverlight help in the Resource Center is also a great example.

1:00:23 We have something in here called the interactive SDK...

1:00:27 ...where you can actually run in the website here.

1:00:30 This is not a static snapshot, it's actually an application.

1:00:33 And if you like what it's doing, you just click the code behind and grab that code and run with it.

1:00:40 The various development teams and engineers at Esri like to blog.

1:00:43 They like to blog to let you know the latest of stuff that they're working on...

1:00:46 ...and also to hear back from you with whatever comments that you leave for them.

[1:00:50](#) So that's a great way.

[1:00:51](#) I know here you're talking to a lot of Esri staff, that's great.

[1:00:54](#) But in between these conferences, this is a great way...

[1:00:56](#) ...to find out what's new and to talk to those who are doing it.

[1:01:00](#) We also have a whole set of discussion forums...

[1:01:03](#) ...that we're using vBulletin engine, very popular discussion forum engine.

[1:01:07](#) This forum right here is just one of them.

[1:01:09](#) It's the Python forum.

[1:01:11](#) It's Python, and the audience that I'm seeing in here is not only people that are doing geoprocessing...

[1:01:17](#) ...with Python and they have questions or problems, but also people that are learning Python as they're using ArcGIS.

[1:01:23](#) So it's a great little forum, there's dozens of other discussion forums out there.

[1:01:27](#) We also publish a lot of videos from our conferences...

[1:01:30](#) ...and presentations we do, training workshops, tech workshops.

[1:01:34](#) We even sometimes grab the handheld camera and run around at Esri...

[1:01:37](#) ...and talk to people and we throw that on the video site as well.

[1:01:42](#) We also have an Ideas site.

[1:01:43](#) Have any of you used the ArcGIS Ideas site?

[1:01:46](#) Okay, a couple of you.

[1:01:48](#) This is great, this is where...this is another way that we get to hear from you...

[1:01:52](#) ...about what types of functions and things that you want included or fixed in ArcGIS.

[1:01:58](#) And not only can you enter your idea, but the rest of the community...

[1:02:03](#) ...can vote on your idea with Promote and Demote buttons.

[1:02:06](#) And most teams at Esri, particularly product managers, our engineers and developers...

[1:02:11](#) ...even our team, we're reading this thing all the time and we're using it as a major piece of input...

[1:02:17](#) ...in order to figure out what to do next with the product.

[1:02:19](#) When an idea is under consideration or implemented into the product...

[1:02:23](#) ...we badge it so that you know that it's already been taken care of...

[1:02:26](#) ...or already underway at least on the whiteboard.

[1:02:30](#) A lot of developer help, like adding...like this one for Desktop...

[1:02:34](#) ...adding and removing tools from menus and toolbars.

[1:02:37](#) A lot of descriptive information, a lot of screen snapshots and step-by-step walkthroughs.

[1:02:43](#) ArcGIS Online, great place to find code...

[1:02:47](#) ...find apps, code snippets, layers, layer packages, geoprocessing tasks.

[1:02:52](#) You know, before you write something from scratch, it's good to search around...

[1:02:55](#) ...and see if someone's already done it and if they've shared it.

[1:02:58](#) And ArcGIS Online's a great place to go to do that.

[1:03:02](#) There's over 3,000 public groups that you can join and get the stuff that they're sharing...

[1:03:08](#) ...whether it be apps or maps or layers or what have you.

[1:03:11](#) There's one right there at the top, I think you saw called Python Resources.

[1:03:15](#) It's a group someone created.

[1:03:16](#) Let's create a group for Python Resources and put all kinds of stuff there.

[1:03:21](#) There's web apps and mobile apps that are shared by the community, and you can see these things run.

[1:03:25](#) Some of them have source code, some of them don't.

[1:03:27](#) Even the ones that don't, sometimes you can get some clever ideas on how people did certain things.

[1:03:32](#) And you can always leave comments from them...

[1:03:34](#) ...for the people that uploaded these things, and ask them questions.

[1:03:38](#) Esri Developer Network is a subscription-based product...

[1:03:42](#) ...that you can get basically the entire ArcGIS stack for an inexpensive developer license.

[1:03:47](#) Although the stuff Andy showed, the web and mobile stuff, that stuff's already free for developer use.

[1:03:52](#) It's not a part of EDN.

[1:03:53](#) But if you want to get ahold of Server, whether it be on your machine...

[1:03:57](#) ...or in an Amazon EC2 AMI, ArcGIS Engine, ArcGIS Desktop, it's all a part of Esri Developer Network.

[1:04:05](#) We have a jump page, which lets you control your licenses...

[1:04:09](#) ...control your subscription, also some links for resources and also some social media links.

[1:04:15](#) Training, we have a lot of training.

[1:04:17](#) That's online...a lot of classroom training.

[1:04:19](#) In fact, 40 percent of our training seats this year are remote, online training.

[1:04:25](#) And that percentage is continuing to grow.

[1:04:28](#) A lot of people are asking for cost-effective ways to get training...

[1:04:32](#) ...in a way that they don't have to sit in a classroom for a whole week, or travel somewhere.

[1:04:36](#) So everyone's doing this, we are too.

[1:04:39](#) We also have...we still do have instructor-led training.

[1:04:42](#) We have Virtual Campus courses, over 80 courses online.

[1:04:45](#) Those are self-paced that you can take.

[1:04:47](#) Some of them are free.

[1:04:48](#) Live training seminars are all free.

[1:04:51](#) And you should check that out on the site.

[1:04:53](#) Here's an example of a live training seminar.

[1:04:55](#) It's a one-hour training seminar, live webcast...

[1:04:59](#) ...with an interactive text chat to talk to the instructors during the Q&A period.

[1:05:04](#) But it's training.

[1:05:05](#) There's Dave Cardella, you probably saw him during the plenary.

[1:05:07](#) And this was a training course that was done a little while ago...

[1:05:10](#) ...Introduction to the ArcGIS API for iOS.

[1:05:13](#) You want to get started with iOS iPhone apps, you want to use our API...

[1:05:17](#) ...if you weren't able to attend the live webcast, of course, we record these...

[1:05:21](#) ...and we put them up on the training site as well.

[1:05:24](#) So you could always watch the training for free if you weren't able to participate.

[1:05:28](#) And whenever we do one of these live training seminars, we do them three times a day...

[1:05:33](#) ...spaced out around the clock in order to get the greatest global reach as possible.

1:05:38 You don't have to be in the Pacific time zone to take advantage of something like this in business hours.

1:05:46 Tech support is always a great place to get specific problems answered and knock some ideas against.

1:05:52 If you're under maintenance for our products you get tech support, you can log it through a form.

1:05:57 We also have a live text chat...

1:05:59 ...where you can talk to a developer support analyst or technical support analyst for help.

1:06:06 I mentioned this before about the Developer Summit.

1:06:08 This is premier geospatial developer conference of the year.

1:06:11 We had almost 2,000 people here last year in March...

1:06:15 ...and it's a great place to get all the deep-dive developer stuff and get yourself ready...

1:06:21 ...for the next 12 months of using this technology.

1:06:24 It's typically in March in Palm Springs, California...

1:06:27 ...but the cool thing is, if you can't get there, we record all these sessions.

1:06:31 In fact, we recorded about 130...

1:06:34 ...deep-dive developer technical workshops from 30 minutes to 75 minutes each.

1:06:39 Actually, of them are three hours long...the preconference seminars.

1:06:42 We recorded those, too.

1:06:44 And we put them all up on the Resource Center for free...

1:06:47 ...so that you could watch all of those tech workshops if you're not able to get to the Dev Summit.

1:06:52 Dev meet-ups is something we started last year.

1:06:54 It's just a nice technical social that's run by various teams in regional offices around the US.

1:07:01 And we're also kicking this off globally as well, through Esri international distributors.

1:07:07 It's a great place to get together and meet other people that are doing what you're doing.

1:07:10 We normally invite a keynote speaker of developer interest...

1:07:14 ...let you do the Lightning Talk so that you can share with other people what you're doing.

1:07:18 And it's a fun time.

1:07:20 So check that out on esri.com/devmeetup to see when the next dev meet ups are happening.

[1:07:29](#) We'll probably in the next 12 months do about 40 of them within the US and more outside as well.

[1:07:35](#) They're a lot of fun, and they're free.

[1:07:37](#) It's just a few hours after work on a Wednesday or Thursday night somewhere.

[1:07:40](#) We get a back room of a brew pub or a restaurant...

[1:07:42](#) ...make sure it's got Internet connectivity, and we just go for it.

[1:07:47](#) We also promote these and put these up through meetup.com.

[1:07:52](#) Has anyone used meetup.com for any reason?

[1:07:55](#) Okay, so you could just go to meetup.com and search for Esri to see if there's a meet up group near you.

[1:08:00](#) And if there isn't a meet up group near you, let us know.

[1:08:02](#) Get on Twitter, let us know, send us an e-mail, whatever...

[1:08:05](#) ...and we'll see if we can work with you to get a meet up group going.

[1:08:08](#) Of course we're on Facebook, we use Twitter a lot, LinkedIn...

[1:08:11](#) ...because you're already there, so are we.

[1:08:14](#) A lot of people at Esri are on Twitter, great place to find out what's going on...

[1:08:19](#) ...what's new, new blog posts, maybe ask some quick questions as long as they're under 140 characters.

[1:08:25](#) Esri TV on YouTube...constantly putting videos there.

[1:08:28](#) We have a blog just for developers.

[1:08:31](#) ArcGIS Developer blog.

[1:08:32](#) In fact, that's a snapshot of the application that you showed, the Everest application, yeah.

[1:08:40](#) Okay, we have Wiki.gis.com...you can contribute!

[1:08:42](#) We have thousands of documents, hundreds of contributors.

[1:08:46](#) There's a lot of developer content on there as well.

[1:08:49](#) How many of you used to use stack overflow?

[1:08:52](#) If you're a developer and don't use stack overflow, I think you're missing a lot.

[1:08:55](#) It's at least worth a look.

[1:08:56](#) It's not ours, but I wanted to mention it anyway, because it's a great resource.

1:09:00 It's a Q&A site for developers.

1:09:03 You ask and answer developer questions.

1:09:05 You can search for content because it's been around for a little while.

1:09:08 The community votes on what answers are the best.

1:09:10 So when you go to a question and it's got 12 answers, you know the best answers...

1:09:14 ...as voted by the community have already bubbled up.

1:09:16 So you don't have to read the whole document in order to get the information you're looking for.

1:09:20 There's also a stack exchange, very similar...Q&A site.

1:09:23 This one's specific to GIS.

1:09:25 Again, it's not ours, but I wanted to mention it because if you're doing GIS...

1:09:29 ...even GIS development, this is a great place to go.

1:09:31 Ask, answer, vote, rate, and support the community.

1:09:36 And learn...if you're new to development in general.

1:09:40 How many of you have read this book, Code Complete?

1:09:43 There's lots of books out there, and you go to Borders...

1:09:45 ...oh, you know, shelves of how to do whatever with development.

1:09:49 If I had to recommend one book for someone who is a GIS professional...

1:09:52 ...that's just getting started with the hacking...

1:09:54 ...maybe not classically trained in software development...

1:09:58 ...of the entire development cycle, the center section is coding...the coding itself.

1:10:03 And this book helps you with a lot of the concepts of starting to think like a coder...

1:10:08 ...so that you can code efficiently and write code that works well...

1:10:13 ...it's efficient, it's easy to test, it's easy to modify.

1:10:16 It's a great book, it's been around for years...

1:10:18 ...but it's just recently been updated to reflect some new technologies.

1:10:23 So welcome to the conference, I know we're right in the middle of it.

1:10:26 We have 30 developer track sessions, product islands...

1:10:29 ...you can talk directly to the engineers and developers...

1:10:31 ...you've got specific problems you can go to the tech support island.

1:10:35 And I just want to mention, esri.com/sessionevals is a place you can go for all the sessions...

1:10:40 ...that you go to give us some feedback if you wouldn't mind, and let us know...

1:10:44 ...how it went and how we can modify it for next year.

1:10:47 In fact, we did this session last year...

1:10:50 ...but we had it all oriented toward experienced developers that are new to GIS.

1:10:54 And we totally missed the mark on the GIS pros that are new to development.

1:10:59 And we got that in the session evals.

1:11:00 So Andy and I went back to work and we totally reorganized this session.

1:11:05 So if you could give us feedback to how we can make it even better next year, that would be great.