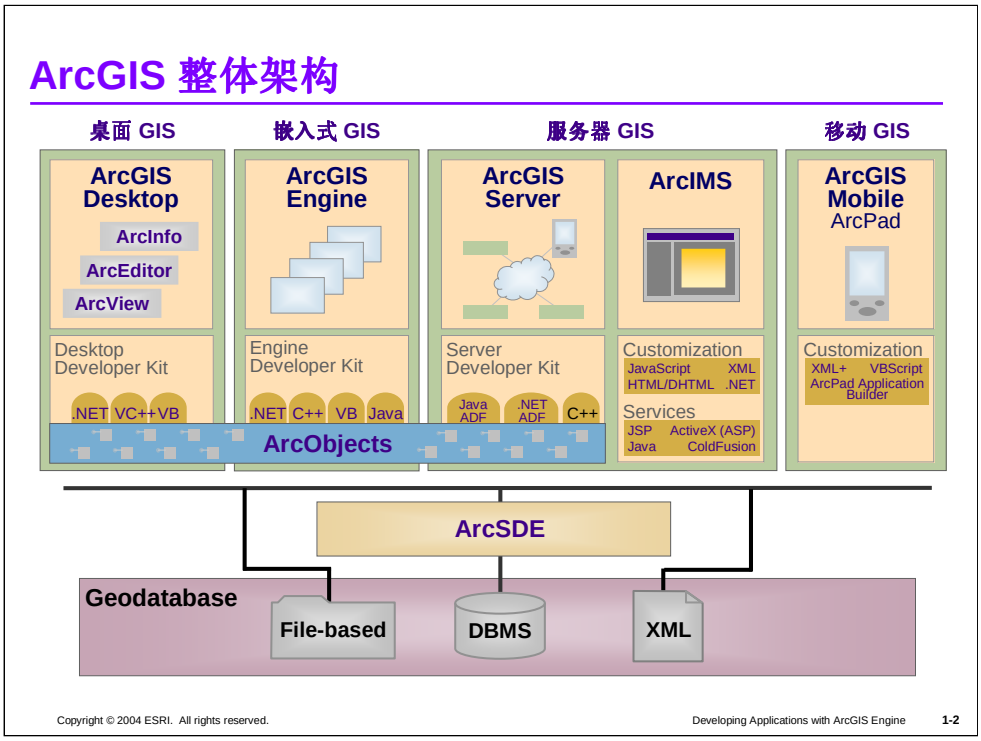


使用 ArcGIS Engine开发应用程序

1

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Developing Applications with ArcGIS Engine



ArcGIS® is an integrated collection of GIS software.

ArcGIS Desktop: An integrated, scalable suite of software for compiling, authoring, analyzing, mapping, and publishing geographic information and knowledge. ArcGIS Desktop starts with ArcReader™ and extends to include ArcView®, ArcEditor™, and ArcInfo™, each component exposing more GIS capabilities. Additional desktop extensions expand GIS capabilities further.

Embedded GIS: Use ArcGIS Engine to develop custom desktop GIS applications or embed GIS functionality in existing applications. These focused solutions can then be easily deployed throughout an organization.

Server GIS: Create and manage server-based GIS applications that share GIS functionality and data within organizations and to many other users on the Internet.

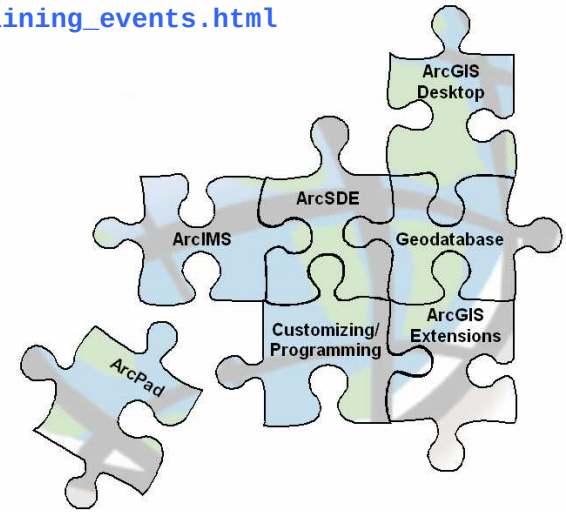
- ArcGIS Server is a central application server that is used to build serverside GIS applications that run in enterprise and Web computing frameworks.
- ArcIMS® is a scalable Internet Map Server for publishing maps, data, and metadata over the Web using standard Internet protocols.
- ArcSDE® is an advanced spatial data server for accessing geographic information in relational database management systems.

Mobile GIS: ArcGIS technology can be deployed on a range of mobile systems from PDAs, to laptops and Tablet PCs. ArcPad® coupled with a wireless mobile device that is location enabled is widely used for data collection and GIS information access in the field.

ESRI培训资源

http://www.esri.com/training_events.html

- 知识来源
  - 培训讲解
  - 虚拟大学课程
  - 相关的会议
  - Web站点



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Depending on which ESRI software your organization has licensed, your skills, and your plans for upcoming projects, you may benefit from additional training on advanced topics, on specialized software, or on background topics to refine your understanding of GIS and related technologies.

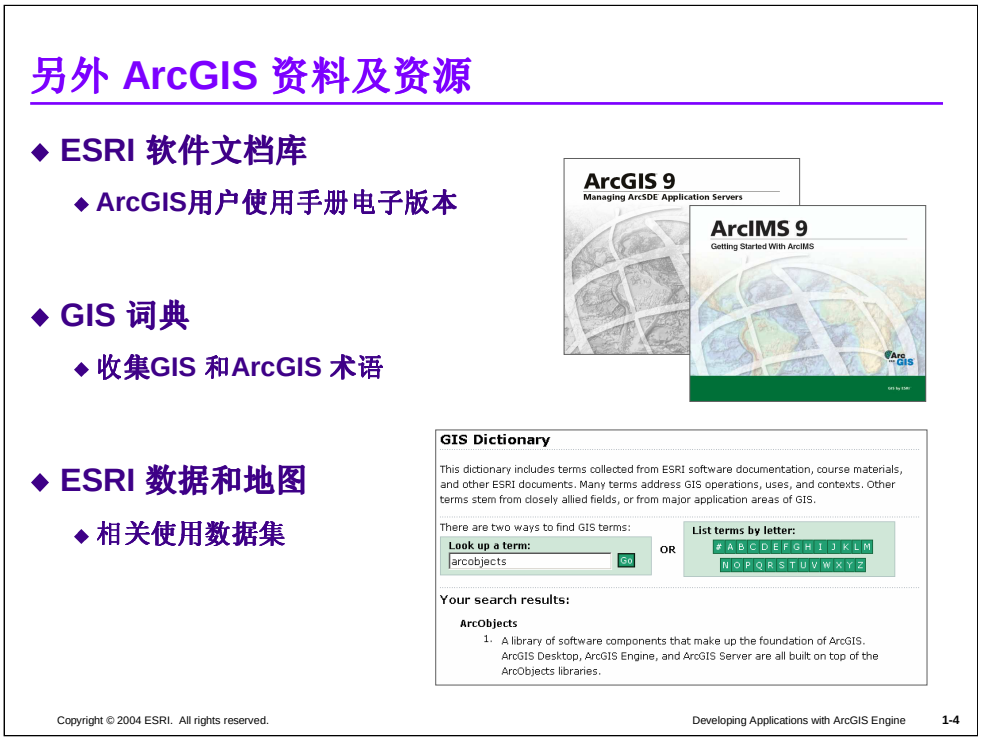
Detailed information about Instructor-led and Web-based courses—including a list of topics covered, intended audience, duration, schedules, and pricing—is available in the *ESRI Course Catalog*. You can access this catalog on the Web at http://www.esri.com/training/index.html.

Web-based courses offer convenience and savings. Also, many ESRI Virtual Campus courses include a free lesson, called a *module*. You can create a free account and begin training with these free modules within minutes at http://campus.esri.com.

In addition to Web-based courses, the Virtual Campus also offers free live training seminars, training seminars, and Web workshops. Live training seminars are focused lectures on a variety of GIS topics for all levels of users. Training seminars are free recordings of live training seminars, viewable at your convenience. Workshops are recordings of live training seminars, viewable at your convenience, plus printable slides of the presentation, questions and answers from the live training seminar, a software exercise with accompanying data, an optional exam to assess understanding, and a certificate for successfully completing the exam.

Learning Pathways

Learning Pathways are collections of instructor-led and Virtual Campus courses organized to generate job-specific knowledge and skills for particular subjects. There are no extra fees, and each Learning Pathway ends with a certificate of completion. Learn more about Learning Pathways at the ESRI Training Web site.



ESRI Software Documentation Library

The ESRI Software Documentation Library is a digital collection of the books that accompany ArcGIS. This collection is available online at the ESRI Support Center under Product Documentation for each software type, and is also on a CD in the ArcGIS Media Kit (once this CD is installed, all books will be available in <installation_directory>\ESRI_Library).

GIS Dictionary

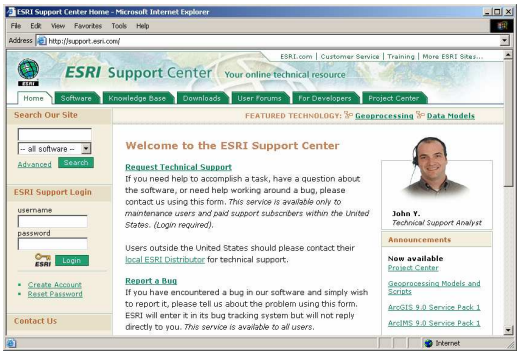
The GIS Dictionary defines terms commonly used in ArcGIS applications and general GIS. Many terms originate from GIS operations, uses, and contexts; others, from closely allied fields and major application areas of GIS. The GIS Dictionary is available online at the ESRI Support Center or through ArcGIS Help.

ESRI Data and Maps

The ESRI Data and Maps CD, included in the ArcGIS Media Kit, contains many types of map data at many scales of geography. All vector data is in Smart Data Compression (SDC) format; raster data is in various formats, including ESRI Grid and MrSID image formats. Be sure to review all information about the data, including redistribution rights and metadata documentation, before redistributing any of this data.

ESRI 支持中心

- 在线支持中心
  - http://support.esri.com
- Knowledge Base
  - 技术文章
  - 白皮书
  - 系统要求
- 下载
  - 补丁
  - 数据模型
  - 代码和例子
- 用户论坛
  - 讨论组
  - E-mail lists



- 联系ESRI
  - 请求技术支持
  - 报告BUG
  - Suggest a software enhancement

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ESRI's primary resource for software support is the ESRI Support Center at http://support.esri.com.

Knowledge Base

The Knowledge Base is a searchable database of focused technical articles. It includes answers to frequently asked questions, step-by-step directions for performing common tasks, and workarounds for known software limitations. The Knowledge Base also contains topic-focused white papers organized by product, system requirement information, and product documentation.

Downloads

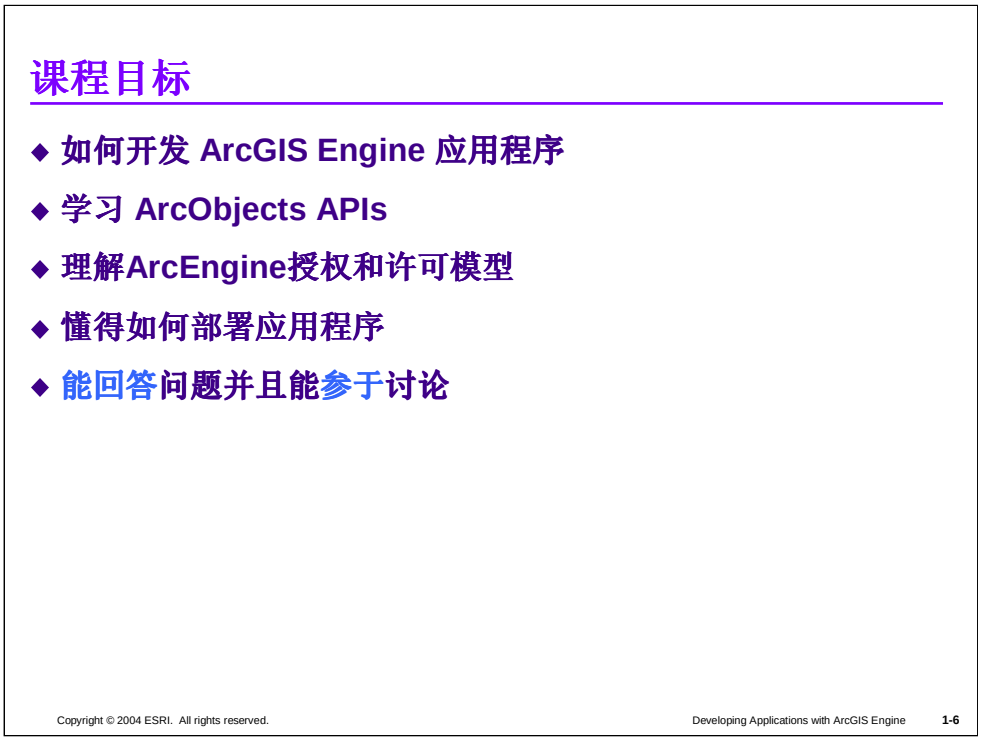
Obtain the latest software correction, software and code samples, utilities, tutorials, user contributed scripts and sample code (ArcScripts), data models, and evaluation software from ESRI's download page.

User forums

In the user forums, you can ask questions, provide answers, and exchange ideas with other ESRI product users. Resources include several discussion forums, and two subscription e-mail discussion lists moderated by ESRI. ArcView-L is for ArcView users, and ESRI-L is for users of all other ESRI products.

Contact ESRI

Through the ESRI Support Center, you can contact ESRI to request technical support, report a software bug, submit a software enhancement request, and learn more about registration, licensing, and updates.



Course objectives

In this course you will learn how to develop ArcGIS Engine applications. You will learn the application development framework and how to extend the framework. The licensing and deployment model will also be covered.

时间安排

上午

- 介绍
- 基本原理和许可
- 使用控件进行开发

下午

- 使用3D控件进行开发
- 框架扩展
- 部署

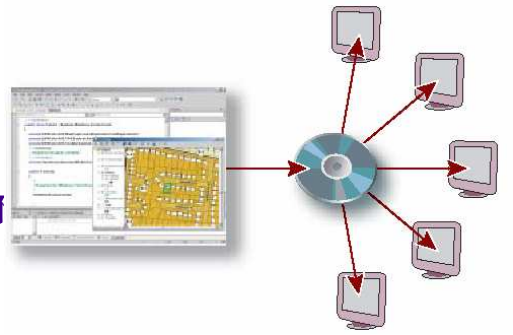


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Day 1	Day 2	Day 3
Lesson 1: Introduction Lesson 2: Introduction to geoprocessing	Lesson 6: Batch processing and advanced scripting	Lesson 10A: Geodatabase raster
Break	Break	Break
Lesson 3: Working with ModelBuilder	Lesson 7: Advanced modeling	Lesson 10B: Geodatabase XML import and export
LUNCH	LUNCH	LUNCH
Lesson 4: Using Command Line	Lesson 8: ArcReader and Publisher enhancements	Lesson 11 and 12: 3D symbols and ArcGlobe
Break	Break	Break
Lesson 5: Introduction to scripting	Lesson 9: Labeling and annotation enhancements	Lesson 13: Developer overview

ArcGIS Engine Developer Kit是什么?

- 一个可嵌入式的 GIS 组件用来创建客户应用程序
- 容易设计、配置、开发
  - 可扩展
  - 可展开
  - 可分发
- 是面向开发者的产品，而不



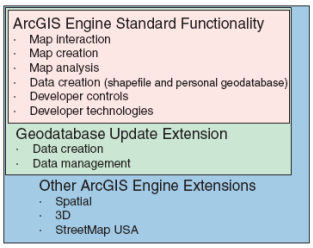
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ArcGIS Engine Developer Kit

ArcGIS Engine Developer Kit is a component-based software development product for building and deploying custom GIS and mapping applications. The ArcGIS Engine consists of a software development kit and a re-distributable runtime required for any ArcGIS Engine-based application. It is not an end user product but rather a toolkit for application developers. The software components called ArcObjects that compose the Engine are operating platform neutral and can be called from various programming interfaces, such as .NET, Java, COM and C++. ArcGIS Engine is suitable for building basic mapping up through comprehensive, dynamic GIS applications for Windows, Solaris or Linux users.

ArcGIS Engine 产品和扩展

- **ArcGIS Engine Runtime**
  - 运行所有的ArcEngine应用程序都必需的
  - 安装在客户机的终端
  - 不同的 runtime 许可是可选择的
- **ArcGIS Engine Developer Kit**
  - 为开发者而设计
  - 包括所有库和开发资源
  - 所有选项都是已经激活
- **许可通过软件授权**



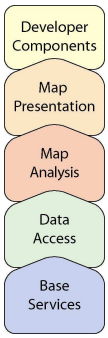
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ArcGIS Engine Runtime

All applications built with the ArcGIS Engine SDK require ArcGIS Engine Runtime, with appropriate license, to execute successfully. ArcGIS Engine Runtime is the platform on which ArcGIS Desktop is built. This allows users of ArcGIS Desktop applications to execute custom applications based on the ArcGIS Engine, if permitted by the ArcGIS Engine application developer. There are multiple ArcGIS Engine Runtime Extensions ranging from standard to enterprise options.

ArcObjects 的功能那些是可用的?

- 基础服务
  - 核心函数, 几何操作
- 数据存取
  - 可以访问栅格数据和矢量数据
- 地图分析
  - 高级空间分析和SQL 访问
- 地图表达
  - 标注, 符号化, 专题图
- 开发组件
  - Developer kit, mapping 和 3D 控件, toolbar, TOC



ArcGIS Engine

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ArcObjects functionality

The ArcGIS Engine SDK provides access to a large collection of GIS components, or ArcObjects, that fall into five categories:

Base Services: The core GIS ArcObjects required for almost any GIS application, such as feature geometry and display operations.

Data Access: ArcGIS Engine provides access to a wide variety of raster and vector formations including the power and flexibility of the geodatabase.

Map Analyses: ArcGIS Engine provides a powerful set of functions that allows applications to create, query, and analyze cell-based raster data.

Map Presentation: ArcObjects for map creation and display with symbology, labeling, and thematic mapping capabilities including custom applications.

Developer Components: High-level user interface controls for rapid application development and a comprehensive help system for effective development.

能创建哪种类型的应用程序?

- 可以创建任何类型的独立的GIS应用程序
- 例如：独立，嵌入式的以及交叉平台的。
- 可视
  - Mapping, drawing, selecting, editing, …
- 不可视
  - Utility, editing, updating, …

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The capabilities of ArcGIS Engine are extensive. You can use the ArcGIS Engine developer kit to successfully build stand-alone applications. There is a wide variety types of applications that can be built. In general there are three types of ArcGIS Engine applications:

Stand-alone, non-visual applications, such as command-line batch driven, utility applications

Stand-alone, visual applications, such as Windows and control-based applications. Graphical user interface applications will make use of the extensive ArcGIS Controls exposed in the developer kit. These controls include everything you need to build a sophisticated front-end application.

Embedded applications: You can embed GIS functions into existing applications such as Word and Excel.

ArcGIS Engine 应用程序开发过程

- **步骤**

1) **创建并且设计好数据**
2) **确定使用哪种应用程序**
3) **执行软件授权代码**
4) **编写应用程序的功能**
5) **部署发布**

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开发必备

- 课程
  - *介绍 ArcGIS I* and *介绍 to ArcGIS II*
  - *介绍 设计 ArcObjects with VBA* or 6 months VBA 设计练习
- 设计程序
  - 懂得，知道 COM
  - 懂得使用开发工具 (VB, .NET, VC++, Java, C++)
- ArcObjects
  - Basic understanding of how to program ArcObjects
  - Know the developer resources

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开发资源

- ArcGIS Developer Help
  - 开发向导
  - 特定开发语言的帮助 (VB, VC++, .NET, Java)
  - 对象模型向导
  - 书本和技术文档
  - 例子
- Developer tools
  - Add-ins 和工具集
- ArcGIS 开发在线
  - 最新开发信息，论坛 …
- 附录

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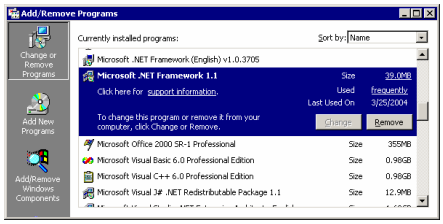
安装和配置

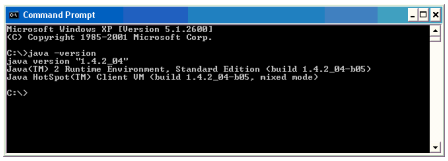
- Engine 开发要求如下：
- 如何安装
  - 产品和developer kit
- 如何配置
  - 开发资源
  - 开发环境
- 产品许可

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1. 安装之前: .NET 和Java 支持

- 使用.NET和Java开发，要求有更多支持
- .NET
  - .NET Framework 1.1
  - 从 MSDN下载
- Java
  - Java J2SDK 1.4.2
  - 从Sun下载
- 设置 JDK home路径
  - JAVA_HOME =c:\j2sdk
  - PATH=..;%JAVA_HOME%\bin





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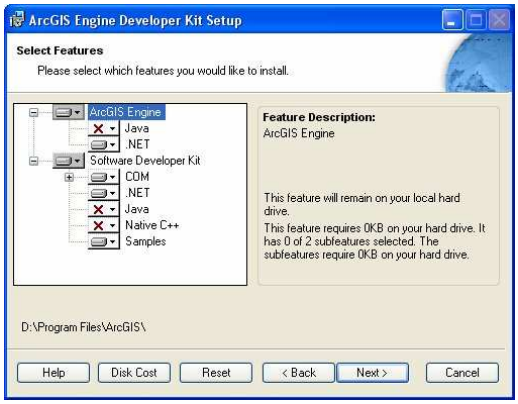
System requirements

The .NET framework version 1.1 and Java JDK version 1.4.2 need to be installed prior to running the Engine Developer Kit Setup. The JDK is necessary to unpack some of the .Jar files utilized in samples that ship with the developer kit. If the .NET Framework Version 1.1 is not found, the ArcGIS Engine subfeature for .NET will not be available in the Setup Dialog.

The JDK can be downloaded from: http://java.sun.com/j2se/1.4.2/download.html.

2. ArcGIS Engine 安装

- COM库全部自动安装
- 其安装路径是默认到其他已经安装的ArcGIS产品的路径



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COM libraries

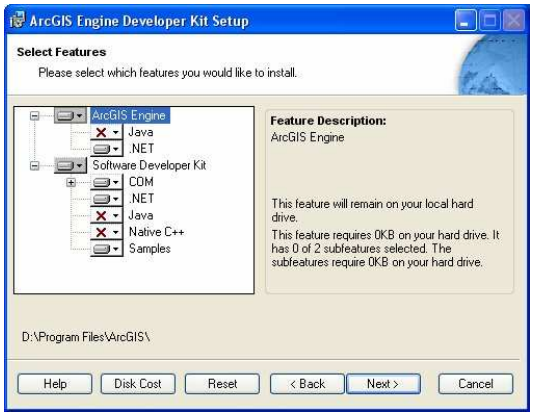
The COM binaries are required for any Engine developer, regardless of the chosen API that is used to create applications with ArcObjects.

ArcGIS Engine options

The Java option will install .jar files for each library in the Engine Developer Kit. A private JRE also gets installed under the Java subdirectory.

3.ArcGIS Engine Developer Kit 选项

- 语言组件
  - COM
  - .NET
  - Java
  - C++
- 帮助文档
- 工具
- 例子



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API components

In some cases, extra developer tools may be included when specific API components are installed. When the Java option is chosen, ESRIANT (an ESRI version of a java build utility) is added to the Developer Kit to help run the Java samples.

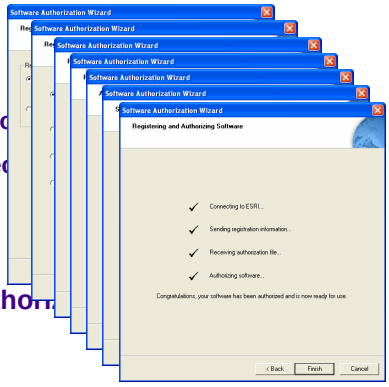
Samples

The samples are not installed by default. The samples are organized according to product. A developer will get all samples for Desktop, Engine, and Server products when installed. Samples may be queried using language as a criteria, and source code is available from the install location. A useful help topic ‘How to Use the Samples’ provides language-specific instructions for working with any sample.

4. 软件授权

步骤：

1) Purchase ArcGIS Engine Developer Kit
2) Register product with ESRI
   1) Contact service.esri.com
   2) Registration number is included in bo
3) ESRI sends you an authorization file (.ec
4) Manually run the authorization wizard



- Alternatively, you can dynamically authori
  after by registering over the internet
  - No .ecp file is sent to user

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Post-installation

Using a new copy protection mechanism with 9.0, Developer products need to be authorized on a per-machine, single-use basis. An authorization file must be obtained to complete the post-installation for both the ArcGIS Engine Runtime and the ArcGIS Engine Developer Kit.

ArcGIS Engine designer许可

- 允许“design”和“develop” ArcGIS Engine应用程序
- .ecp文件包括激活函数代码
  - Designer
  - standardengine
  - gdbedit
  - streetmapengine
  - streetmapusa
  - spatialengine
  - 3dengine
- All levels of functionality are available for development
- 使用AuthorizationSummary.exe确认许可配置

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ArcGIS 9 software authorization

The following products need to be authorized for use: ArcView Single Use, ArcGIS Engine Developer Kit, ArcGIS Engine Runtime, ArcGIS server, ArcSDE, and ArcIMS. A new ESRI Customer Service website has been launched to help automate obtaining authorization files and licenses. Navigate to http://service.esri.com and click Product Registration. Select a product for authorization and follow instructions to obtain the appropriate file. You may register products during the installation process or at a later time after installation by running the Software Authorization Wizard. The wizard may be accessed from the ArcGIS Program Group.

配置开发资源和环境

- 开发资源
  - 执行register_in_menu.reg 文件
- 开发环境
  - VB 6 和 .NET
    - Register the developer add-ins (VB6 and .NET)
  - Java (NetBeans)
    - 指定正确的JDK
    - 设置环境变量来运行samples and utilities
      - ARCENGINEHOME=C:\Program Files\ArcGIS
      - ANTHOME=%ARCENGINEHOME%\DeveloperKit\tools\ant
    - Reference Engine JAR files in your IDE
    - Configure the JavaDoc

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课程资料

- Books
  - 讲稿PPT
  - 练习
- CDs
  - 课程 数据
- Online course evaluation

  http://classeval.esri.com
  - Requires Course Identification Number



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Teaching methods

Research indicates that students learn differently. This course maximizes your learning experience by combining instructor-led lectures and discussions, demonstrations, computer-based exercises, and review questions.

Class materials

Your class materials include lecture and exercise coursebooks. These are yours to take home, so feel free to write in them.

REPLACE FOLLOWING PARAGRAPH WITH COURSE-SPECIFIC NOTES

The class data CD contains all the datasets you will work with during class. A second CD contains the ArcSDE 8.1 for SQL Server software, which you will install later today.

Course evaluation

Your feedback improves ESRI's courses. At the end of the week, please evaluate the following:

• Instructor • Course materials • Teaching facilities • Overall course