



P r o f e s s i o n a l E x p e r t i s e D i s t i l l e d

Administering ArcGIS for Server

Installing and configuring ArcGIS for Server to publish, optimize,
and secure GIS services

Foreword by Andrew Zolnai, Cambridge, UK

Hussein Nasser

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Administering ArcGIS for Server

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Hussein Nasser



BIRMINGHAM - MUMBAI

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Foreword

GIS is a mature industry, with its roots in the late 60s in forestry and county polygon maintenance through vector topology (others such as GRASS and IDRISI concentrated on the raster domain). Storing location and attribute information has been a challenge, not only since the early days of severely limited computing power and storage space, but even today in the management of ever-growing spatial and tabular repositories. This has been handled in several ways: two tenors being Esri Arc/Info separating the spatial and the tabular repositories, and Oracle Spatial embedding them in database tables. Esri evolved from the desktop to the server by offering SDE, a layer between its data and RDBMS that effectively spatialises database tables.

After the arrival of the Internet, further web services have been devised by commercial and open source technologies alike, but that is a subject in its own right? And while RDBMS scales hardware such as Oracle Exadata, as data expands to petabytes in real time, a whole other arena such as Amazon services or SAP in-memory addresses Big Data. But what about big geo data?

ArcGIS for Server is the third generation that adds a host of management, integrity, and performance tools designed to help implement scalable enterprise GIS.

Hussein is a geo enthusiast, whose chief concern is to make the "Gen 3" mid-section above amenable to geo experts and project engineers alike. As a practitioner in the field, he brings a deft touch to the ins-and-outs of this powerful yet complex offering. Esri being the de facto server geo standard, this book will benefit a wide array of infrastructure administrators and application engineers. Yet Hussein's clear prose explains it well enough; his first principles will allow his audience to apply their lessons learned to other platforms, and therein lies the "sweet spot":

ArcGIS for Server offers interoperability to many other server and service platforms.

This book will thus be a great learning guide to help you understand the interconnectivity of data and applications. The biggest takeaway may be that readers will discover the "Internet of things" as a real-world paradigm, rather than just concepts "in the clouds" or "in the cloud". As an IT and poet friend once said: "Ladies and gentlemen... start your servers... and let the geo begin!"

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About the Author

Hussein Nasser is an Esri award-winning Senior GIS Solution Architect at Electricity & Water Authority, Bahrain. In 2007, he won the first place at the annual ArcGIS for Server Code Challenge, conducted at the Esri Developer Summit in Palm Springs, California, for using AJAX technology with ArcGIS for Server, which was not implemented back then. He spent eight years as a GIS Architect at leading Middle Eastern engineering company Khatib & Alami, implementing various Utilities GIS systems based on Esri technology across the Middle East. Hussein then moved to a more focused environment at Electricity & Water Authority, Bahrain, his homeland, where he could channel his expertise to develop a robust GIS Utilities solution and fully integrate it with the e-government project to help Bahrain move towards the smart grid. In addition, Hussein is fascinated with peak research topics, including papers he is currently working on: *The Human API: A Software Interface to Prevent Cancer, Global Economic Crisis and Natural Disasters Quantum Detector*, and *Stock Market and the Moon Phase*.

Writing this book was not easy, however, having the closest people's support definitely made it enjoyable. I would like to thank my wife, Nada, who was patient and supportive throughout this journey; I would stay up at some nights while she made me my favorite tea, sometimes when I didn't write for a while she would fire up my laptop, prepare my tea, pair my headset to stereomood.com, and ask me to resume writing. She even sometimes forced me to take long breaks when I wrote too much. I would like to thank my mother for encouraging me to be the best in what I do and for her faith in me, which lights up in her eyes when I see her. I would like to finally thank my wise friend, Andrew, for pointing me in the right direction when I seemed lost. To my family and friends who knew about this book and encouraged me to finish it, thank you.

About the Reviewers

Paul Crickard is a systems administrator in Albuquerque, New Mexico. He has a master's degree in Political Science and has presented papers at the United States Naval Academy's Foreign Affairs Conference and the American Journalism Historians Association Regional Conference in Salt Lake City. He has given demonstrations on the use of Revit, BIM, and GIS to the Public School Facility Authority in New Mexico and the Albuquerque BIM505 users' group. Above all, he is loved and adored by his beautiful wife and son, without whom all other accolades pale in brilliance.

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Tram Vu Khanh Truong received her master's degree in Regional and City Planning at the University of Oklahoma and has worked in the planning field for almost four years. Currently, she is a Transportation Planner at the Greensboro Urban Area Metropolitan Planning Organization. Her duties include GIS development, data analysis, and Transportation System Planning. Tram Truong has a passion in utilizing GIS in transportation planning to support decision making and linking multimodal transportation planning with mixed use of land development planning.

John (Yiguang) Zhang has been in the geospatial industry for over 20 years with a strong background in GIS, photogrammetry, and remote sensing. He has been working as a GIS developer and analyst for the past 15 years and has experienced various GIS projects from start to finish on the GIS application design, development and implementation, GIS analysis, and map production. He has also managed complex spatial databases and experienced a lot of spatial data conversion and integration processes. His creative thinking skills have helped him solve problems effectively through the course of his career in public and private sectors, such as city of Chilliwack and Inergraph. He is proficient with Esri ArcGIS family products including ArcGIS Desktop and ArcGIS Server and spatial database management systems such as Oracle Spatial, SQL Server, and Open Source PostgreSQL/PostGIS. He is also competitive in .NET and Web 2.0 technologies. He holds a master's degree in Digital Photogrammetry and an advanced diploma in GIS from British Columbia Institute of Technologies, Canada.

Firstly, I'd like to thank my wife, Winnie, for dedicating her time in taking care of the family, and for her patience with this wonderful book review and other projects. I would also like to thank my son Sylvester and daughter Sylvia for their bright ideas to the problems I had to solve.

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Preface

If you are at a library and you grabbed this book, chances are that you have heard about ArcGIS for Server in a meeting and you want to know what this product is and what it is capable of. You might have picked up this book because you were explicitly asked by your manager to investigate the capability of this bleeding-edge technology and report with tangible results. Or maybe you are a system administrator who is in the middle of implementing ArcGIS for Server as your backbone architecture. Whether you are a curious blogger, a business developer, or a technical system analyst, I can guarantee that this book won't disappoint you.

Administering ArcGIS for Server was designed for all levels. You might get a satisfying definition of the product and its components, with comprehensive and straightforward illustrations, by reading the first chapter of this book. If you want to just test ArcGIS for Server, you can get it up and running in testing track – a quick, simple, and efficient method for installation – and do the exercises in most of the chapters. If you are planning to set up ArcGIS for Server on your production environment, you can fully read all of the chapters and appendices and explore the advanced security preferences and performance tips to make your setup run optimally.

What this book covers

Chapter 1, Best Practices for Installing ArcGIS for Server, introduces the product and illustrates its architecture and components. It then takes you through three tracks for installing the product: the simple testing track, the advanced tech-savvy production track, and finally the last track, which will show you how to set up and configure ArcGIS for Server specifically as a virtualized environment.

Chapter 2, Authoring Web Services, teaches you the concept behind a web service and different communication protocols. You will also learn how to author and publish GIS services so various clients can consume them.

Chapter 3, Consuming GIS Services, illustrates how to consume services that you learned to author and publish in the previous chapter. You will learn how to visualize, edit, and analyze services using different clients.

Chapter 4, Planning and Designing GIS Services, is where you will analyze requirements and plan what services you want to have. You then will use the planning result to design the services you nominated with rich UML tools. You will also learn to design the underlying geodatabase, which is the source that feeds these services.

Chapter 5, Optimizing GIS Services, shows you how to select the correct parameters and preferences that will make your ArcGIS for Server run at its optimal state. Optimization techniques such as pooling, process isolation, and caching can be applied to bring the most out of your ArcGIS for Server and make your services run much more efficiently and effectively.

Chapter 6, Clustering and Load Balancing, introduces the concept of clustering, a new technique that allows you to group machines into a cluster. You can then assign services to run on each cluster based on machine power, memory, or even on networking factors.

Chapter 7, Securing ArcGIS for Server, introduces different security mechanisms available on ArcGIS for Server. GIS-tier authentication, Web authentication, and HTTPS can be applied interchangeably, depending on the security level desired by your organization.

Chapter 8, Server Logs, will teach you how to harvest the logs and reports generated by ArcGIS for Server and use them to monitor your system effectively. There are different levels of logs, ranging from abstract to detailed, and the level you configure for your setup will depend on how thoroughly you want to monitor your ArcGIS for Server. Fine and detailed logs come with a performance penalty.

Appendix A, Selecting the Right Hardware, describes how to select the right hardware for your ArcGIS for Server environment by providing general rules of thumb. I have come up with formulas that you can use to calculate the number of cores and amount of memory required to serve your users.

Appendix B, Server Architecture, will display the difference between the old and the new ArcGIS for Server architecture. You are going to learn how ArcGIS for Server has survived the 32-bit architecture locking trap and migrated to the more effective 64-bit architecture.

What you need for this book

You need the following software for this book:

- A Browser, preferably Google Chrome, which you can download from <http://www.google.com/chrome>.
- Esri ArcGIS for Server 10.2 or 10.1, preferably 10.2, which you can download a trial of from <http://www.esri.com/software/arcgis/trial> or order from your local Esri distributor.
- Esri ArcGIS for Desktop 10.2 or 10.1, preferably 10.2, which you can download a trial of from <http://www.esri.com/software/arcgis/trial> or order from your local Esri distributor.
- Microsoft SQL Server Express 2012, which you can download for free from <http://www.microsoft.com/en-us/download/details.aspx?id=29062>.
- Oracle VirtualBox, which you can download for free from <https://www.virtualbox.org/>.

Who this book is for

Whether you are a GIS user, analyst, DBA, system administrator, or programmer with a basic knowledge of Esri GIS, this book is for you. Although the book is tailored to fit system administration and analyst requirements, users can find it equally useful. Each chapter segregates the advanced technical tips from the basic and required tasks. This makes it easier for users to perform only the necessary steps to run the software.

Conventions

In this book, you will find a number of styles of text that distinguish between different kinds of information. Here are some examples of these styles and an explanation of their meaning.

Code words in text are shown as follows: "Naturally, each GIS server generates its own logs and this is all saved by default at C:\arcgisserver\logs\."


A block of code is set as follows:


```
FINE Nov 17, 2013, 11:29:17 AM REST request received. Request size
is 178 characters. Parcels.MapServer
```

When we wish to draw your attention to a particular part of a code block, the relevant lines or items are set in bold:

```
<%  
Dim r  
Randomize (Timer)  
r = Rnd()  
r = r * 100  
r = Round(r)  
Response.Write(r)  
%>
```

New terms and **important words** are shown in bold. Words that you see on the screen, in menus or dialog boxes for example, appear in the text like this: "From the **View Log Messages** panel, click on **Query** to view the current logfiles."

 Warnings or important notes appear in a box like this.

 Tips and tricks appear like this.

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1

Best Practices for Installing ArcGIS for Server

ArcGIS for Server (hereafter known as **Server**) installation is a challenging task; use a parameter that does not fit your requirements, hardware, or operating system, and you will end up with a buggy launch, unexpected errors, and an unstable setup. This will eventually force you to waste precious time and resources reinstalling and reconfiguring the product. If you are an ArcGIS user, you will know the pain of having that one small problem which can only be fixed by completely reinstalling the product. Therefore, having the right configuration will help you save a lot of time later and result in a much healthier setup.

In this chapter, we will define the Server site, which holds all configurations, including **web servers**, **GIS servers**, **logfiles**, and **data stores**. Then, we will thoroughly explain the different installation tracks that you can select for ArcGIS for Server.

Installation tracks

There are three different installation tracks that we will offer in this book.

The **Testing Installation Track** offers the typical installation with minimum configuration for those of you who wanted to test the technology. The **Production Installation Track** has the comprehensive and best practices configurations. And finally, the **Virtualized Environment Installation Track** shows how to configure Server specifically as a virtualized environment.

Testing Installation Track

If you are a student who wants to explore the ArcGIS technology or an employee who wants to introduce this product to his/her firm, or just have an older version of Server that you wish to upgrade, this is a good starting track for you. You can also select this track if any of the following criteria holds true for you:

- You have a workstation running Windows 8 or 7 and you want to test this product
- Performance doesn't matter for you at this stage
- You are not behind a proxy server
- You do not want to add multiple servers to your Server site
- You are not concerned about **load balancing**, a process of balancing the incoming requests across a spectrum of machines to ensure fair load distribution on each one of them
- You do not want to publish your services publicly online; rather, you want to use it on your local area network
- You have a very small user base, for whom you will probably write an HTML5 site to consume the services from your tablet or phone over Wi-Fi

Production Installation Track

If you already know the product capabilities or have performed a Testing Installation Track and you are ready to take your Server installation to the next level, go for Production Installation Track. If you have a powerful server linked to an **Active Directory Domain Controller**, which contains the users and roles for Windows, performance is a key element. You might add other GIS servers to your Server site later as your user base increases. This track will then help you harness the full power of Server.

Virtualized Environment Installation Track

For those who have never worked with virtualization before, virtualization is the process of breaking down a physical machine into multiple virtual machines that share the host's resources. You can choose to work with Virtualization Track if one of the following statements holds true for you:

- You do not have access to powerful physical machines, but your company provides you with powerful blade servers with a virtualization setup