DNS Introduction - 3 days

CONTENTS:
This course gives you the fundamentals of DNS and all the important terminology is covered. In the course you will learn how to design DNS structure to achieve scalability and high availability. You will learn how to install and configure DNS name servers and you will get an understanding for how zones and domains are delegated, administratively as well as in technical solutions.

TARGET AUDIENCE:
The target audience for this course is networking people, network and DNS administrators as well as managers, people working with IT strategy, consultants, security people and others that need an understanding of DNS and DNS role on the Internet.

PREREQUISITES:
This course requires fundamental knowledge about the Internet and TCP/IP. Experience with either Unix or Windows environments is helpful.

EXCERCISES:
This is a theoretical training with practical exercises.

NOTE: This course is not delivered with the FoldOut methodology.

Introduction
- Background, why was DNS created

Internet before DNS
- DNS design requirements
- Introduction to the concept of a "Resource Record"
- The A and AAAA Records for IPv4 and IPv6 addresses
- Structure Records and Data Records

Caching, TTL and scalability
- Delegation, the key to scalability
- The SOA Record: the start of a new zone, the serial number
- The NS Record
- Zones and domains
- The ice-floe model

Name server roles
- Authoritative name servers
- Iterative mode resolvers (aka recursive name servers)
- Security aspects and threats
- “Cache poisoning”

Root name servers
- The hints file
- The System Query
- Scalability
- Problems with erroneous queries, the AS112 project

Resolvers
- Stub resolver and iterative mode resolver
- Interpretation of response messages
- Recursive and non-recursive queries
- The NXDOMAIN response
- Referrals
- CNAMEs
- Authority at delegation points

Detailed message exchange walk-through

Name server implementations
- New server software and/or new client software
- BIND (both authoritative and recursive server)
- NSD (authoritative-only server)
- Unbound (recursive-only server)
- Other implementations
- Differences, pros and cons

Lab Exercise: Compilation and installation of the DNS software

Debugging tools
- dig, nslookup, others

Fundamental types of Resource Records
- PTR: for address-to-name mappings
- CNAME: aliasing
- MX: mail exchange
- SRV: generic server locator
- TXT: publication of text strings

The named.conf configuration file
- The "options" stanza for global configuration
- The "logging" stanza for tuning of when, how and where to log

Lab Exercise: Configuration of caching only resolver

Private addresses, RFC1918
- NAT, address translation

Name server terminology
- Master and slave
- Primary master
- Hidden master
- Stealth servers

Zones: the administrative entity of DNS
- Zone directives in named.conf
- Zone transfer
- The AXFR operation
- The IXFR operation
- NOTIFY
Lab Exercise: Configuration of an authoritative server
• The “child role”

Lab Exercise: Delegation of sub-domain
• The “parent role”
• Who is responsible for what?

IDN, Internationalized Domain Names
• Problem statement
• Character codes, Unicode
• IDNA, Punycode
• Requirements from and on applications
• Application support

Lab Exercise: IDN

IPv6 and DNS
• New data, new record types
• Nibbles for IPv6 reverse zones, ip6.arpa
• IPv6 data vs. IPv6 transport
• The root name servers and IPv6
• Resolver support

Lab Exercise: IPv6

"Reverse delegations"
• Mappings from addresses to names
• in-addr.arpa
• ip6.arpa

Lab Exercise: Configuration and delegation of a reverse zone

Summary