Unix for Telecommunications

Portfolio Task – P-Project-Bind
Pass/Credit/Distinction/High Distinction Level Task

I. Introduction

This is the major project task in your Unit and should take most of the semester to complete. In this task you will be required to design and deploy a network-based service using existing tools, and to develop and integrate a user interface to your system. The particular task required for this project revolves around deploying a prototype dynamic DNS service with support for multiple zones and users. Details on the task can be found in this task sheet.

II. Purpose

To gain and/or enhance the following practical skills:

- Design and construct unfamiliar network services
- Synthesise knowledge gained throughout the Unit to create a systems solution
- Professional documentation of process and usage of your system

III. Scenario

The corporation in which you work runs and maintains a DNS server which it uses to offer DNS services to customers. Until recently, requested changes to the DNS database from your customers has been minimal and handled via a simple request system:

- The customer asks for a change to the database
- You stop the DNS server
- The zone database files are updated
- The DNS server is restarted

Update requests have recently increased to the point where this system has become unmanageable. Your boss has asked to you to investigate a system that allows the database to be updated dynamically:

- The DNS server does not need to be stopped
- Updates can be performed via a scripted and/or web-page approach
- Access can be given to customers to update their own entries

To accomplish this task, you have been assigned to deploy and configure a BIND server with dynamic update capability, along with a series of scripts and/or CGI based web pages to update the database contents. Your assignment is due the night of the last project presentation session (Portfolio task **C-Presentation**) in week 12.

A. Required Background Knowledge

You are required to perform research into the following topics:

- **DNS and BIND** – How does DNS function in general terms, and how is BIND configured to participate in the DNS distributed database.
- **Dynamic DNS** – How does Dynamic DNS function and how does BIND currently support this functionality
- **Multi-User Support** – Consider how to use the features of both BIND Dynamic Updates, general Unix security, and other mechanisms to support securing DNS zones such that updates can only be performed by the authorised user/customer
- **CLI and CGI Scripting** – Understand the options available for you to automate the process of updating the database

B. Deployment Considerations

You will be required to build, test, and deploy your prototype solution on your *(highest or middle)-numbered* RULE host along with Apache and any scripts you develop.

Note: *If you are unsure which RULE host you must implement your system on, ask your laboratory or tutorial supervisor.*

The organisation also owns the IP address subnet **`136.186.230.0/24`**. If a host is added or removed from the DNS and has an IP address in this subnet, then you should also add/remove the corresponding entry from the reverse lookup zone as well.

IV. Assessment

This section highlights the absolute requirements to achieve the nominated grade for this task

A. Pass

In order to receive a **Pass** for this Portfolio Task, you must at a minimum successfully complete all of the following requirements.

1) Your RULE host is configured to use itself as a DNS server
2) BIND Server is correctly configured to accept dynamic update requests
3) At least two (custom) DNS Zones and the reverse lookup zone are configured to support dynamic updates. It is required that you support a reverse lookup zone for the subnet `136.186.230.0/24`
4) All unknown requests/lookups for names it is not responsible/authoritative for are forwarded to the Swinburne DNS server
5) Either a Web or CLI based tool/script to allow adding and removing entries to the database
6) Adding an entry with an IP address in the range will result in the reverse update zone being updated
7) Developed Software Documentation – A complete list of the location and names of all scripts you have developed
8) User Documentation – Step-by-step instructions on how to add/update/remove DNS entries using all tools (Web and/or CLI) you have developed

B. Credit

In order to receive a **Credit** for this Portfolio Task, you must at a minimum successfully complete all of the following requirements.

1) All **Pass** requirements
2) Your DNS server is configured to accept public DNS queries (from hosts external to your RULE host)
3) Public queries for non-authoritative zones are forwarded to the Swinburne DNS server and then responded to
4) When removing a host from your zone, it will automatically determine the IP address and if it is in the **`136.186.230.0/24`** subnet, remove it from the corresponding reverse lookup zone

C. Distinction

In order to receive a **Distinction** for this Portfolio Task, you must at a minimum successfully complete all of the following requirements.

1) All **Credit** requirements
2) Updating host details correctly functions for all cases of
   - Updating a host with an address `136.186.230.*` to a new address of `136.186.230.*`
   - Updating a host with an external address to a new external address
   - Updating a host with an external address to a new address of `136.186.230.*`
   - Updating a host with an address `136.186.230.*` to a new external address
3) Both a web-based and CLI solution to automating updates has been provided

D. High Distinction

In order to receive a **High Distinction** for this Portfolio Task, you must at a minimum successfully complete all of the following requirements.

1) All **Distinction** requirements
2) Support for multiple users where each user is allowed to update their own zone
3) All users can update the reverse zone
4) Multi-User Documentation – Multi-user solution documentation including:
   - User account details including all usernames and passwords
   - Which zones each user is allowed to update
5) Use your imagination for other features you may want to add to your system. One example might be documentation/scripting to create a new account/zone for a new customer
   Note: *Completing the minimal set of requirements will only guarantee you a minimal **High Distinction** result*

V. Self Assessment

Below are the steps we will take (not necessarily using the exact zones and host names listed here). This is a complete set of tests that will confirm functionality of all level tasks, it is up to you to determine whether you meet your target result.

A. BIND Server

From your rule host:

- Check that `named` was automatically started
- Check `named.conf` that at least two forward zones are correctly configured for dynamic updates and the `136.186.230.*` reverse zone is correctly configured
- Check no errors on starting `named` and that the dynamic zones are functioning
- `nslookup www.google.com` (*or some external address*)
- `nslookup foo.zone1` (*or any host that exists in one of the zones in your DNS server*)
- `nslookup 136.186.230.5` (*or any IP address that is in your reverse zone*)

From my desktop computer (**Credit** level task)

- Configure to use your RULE host as a DNS server
- Repeat three nslookup tests from above

B. Automated tools

Assuming you have two dynamic zones `.zone1` and `.zone2`

- Add `host1.zone1` → `1.2.3.4`
  `nslookup host1.zone1` – Should return `1.2.3.4`
  `nslookup 1.2.3.4` – Should be forwarded to the Swinburne DNS server
- Add `host2.zone2` → `136.186.230.10`
  `nslookup host2.zone2` – Should return `136.186.230.10`
  `nslookup 136.186.230.10` – Should return `host2.zone2`
- Update `host1.zone1` → `5.6.7.8`
  `nslookup host1.zone1` – Should return `5.6.7.8`
  `nslookup 5.6.7.8` – Should be forwarded to the Swinburne DNS server
- Update `host1.zone1` → `136.186.230.11`
  `nslookup host1.zone1` – Should return `136.186.230.11`
  `nslookup 136.186.230.11` – Should return `host1.zone1`
- Update `host2.zone2` → `136.186.230.12`
  `nslookup host2.zone2` – Should return `136.186.230.12`

`nslookup 136.186.230.10` – Should fail with no answer
`nslookup 136.186.230.12` – Should return `host2.zone2`

- Update `host2.zone2` → `9.9.9.9`
  `nslookup host2.zone2` – Should return `9.9.9.9`
  `nslookup 136.186.230.12` – Should fail with no answer
  `nslookup 9.9.9.9` – Should be forwarded to the Swinburne DNS server
- Delete `host1.zone1`
  `nslookup host1.zone1` – Should fail with no answer
  `nslookup 136.186.230.11` – Should fail with no answer
- Delete `host2.zone2`
  `nslookup host2.zone2` – Should fail with no answer
- Tests will be performed with both CLI and CGI interfaces if they exist

C. Implemented code

The code will be examined to see how it works and whether it has been properly structured and commented

D. Documentation

The documentation will be checked to ensure that it is complete (*all required documentation has been submitted*) and is correct (*the nominated instructions work as provided*)

VI. Assessment

For task **C-Project-Bind**, you will be graded to a **Pass**, **Credit**, **Distinction** or **High Distinction** level as per the requirements listed above.

A. High Distinction Assessment

A Project graded at a **High Distinction** level will also be given a score based on the overall quality of the solution and any extra features you have decided to implement. Students will be given a score of **HD1** (meets minimum HD requirements), **HD2** (*Excellent work, cool new features, well implemented*), or **HD3** (*Did you hire a professional to build this*!!!). If a student is eligible for a **HD** result on their Portfolio, this result will be used as partial input to determine the student final score between **80HD** and **100HD**.

VII. Submission

The due date for completion of the project is **11:00pm** on the night of the **final** project presentation session in **Week 12**.

You must upload your documentation and select the Ready for Feedback option in your Doubtfire portfolio by the due date. Once this is done, your RULE host will be disabled until marking is complete.

A. Completion of task in Doubtfire

Your Doubtfire result will be updated once your RULE host has been assessed.