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| St. Mary's University of San Antonio |
| An Expert System for Network Router Configuration |
| Conclusion and Appendices |
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| This document is a guide to setup the development environment on Windows and Debian Linux. |

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# Conclusion

This has been a learning experience in what is manageable for an individual and the author would like to thank his committee for encouraging him to down-size from his original proposal.

# Future Work

This is just a first step in enabling users a better experience with their routers. The quality of the knowledge base will directly reflect the quality of this software product. However, knowledge representation is hard and indeed, the main disadvantage of Expert Systems is quality of the Knowledge-base. One approach to alleviate the difficulty developing the knowledge-base is Business Domain Development (BDD). Software testing packages such as Cucumber, Lettuce, and Behave, allow non-technical domain experts, or subject matter experts (SME), write test cases for software. This allows the SMEs to define software test cases in natural language text. BDD then is analogous to writing a unique scenario for a fixed software engine to carry out, just like a knowledge-base is written for an inference engine. BDD should then be considered to allow SMEs to develop knowledge-bases as natural language text files.

# Source Code

Source code may be browsed online or obtained via the git protocol at http://github.com/meekprize/bakshi

# Glossary And Acronyms

* AS - see Autonomous System
* Autonomous System - Originally, the definition required control by a single entity, typically an Internet service provider or a very large organization with independent connections to multiple networks, that adhere to a single and clearly defined routing policy, as originally defined in RFC 1771.The newer definition in RFC 1930 came into use because multiple organizations can run BGP using private AS numbers to an ISP that connects all those organizations to the Internet. Even though there are multiple Autonomous Systems supported by the ISP, the Internet only sees the routing policy of the ISP. That ISP must have an officially registered Autonomous System Number (ASN).
* BGP or BGP4 - Border Gateway Protocol (version 4 is the current version)
* Border Gateway Protocol - Core routing protocol of the Internet. It maintains a table of IP networks or 'prefixes' which designate network reachability among autonomous systems (AS). It is described as a path vector protocol. BGP does not use traditional Interior Gateway Protocol (IGP) metrics, but makes routing decisions based on path, network policies and/or rulesets.
* DHCP - Dynamic Host Control Protocol
* Gateway -
* IP - Internet Protocol (version 4 is common, version 6 is reluctantly being adopted)
* ISP - Internet Service Provider
* LAN - Local Area Network
* Local Area Network - The defining characteristics of LANs, in contrast to wide-area networks (WANs), include their usually higher data-transfer rates, smaller geographic place, and lack of a need for leased telecommunication lines. ARCNET, Token Ring, and many other technologies have been used in the past, and G.hn may be used in the future, but Ethernet over twisted pair cabling, and Wi-Fi are the two most common technologies currently in use.
* Router -
* Shannon Entropy - A quantification of the information contained in a message usually in units such as bits. Equivalently, the Shannon entropy is a measure of the average information content one is missing when one does not know the value of the random variable. Shannon's entropy represents an absolute limit on the best possible lossless compression of any communication, under certain constraints: treating messages to be encoded as a sequence of independent and identically-distributed random variables, Shannon's source coding theorem shows that, in the limit, the average length of the shortest possible representation to encode the messages in a given alphabet is their entropy divided by the logarithm of the number of symbols in the target alphabet.
* SOHO - Small Office/Small Home. Consumer-grade. Not enterprise level.
* TCP - Transmission Control Protocol
* TCP/IP - Suite of protocols used in computer IP networks
* VPN - Virtual Private Network
* WAN - Wide Area Network
* Wide Area Network - WANs, in contrast with personal area networks (PANs), local area networks(LANs),campus area networks(CANs), or metropolitan area networks (MANs) are not limited to a room, building, campus or specific metropolitan area (e.g., a city) respectively. The largest and most well-known example of a WAN is the Internet. WANs are used to connect LANs and other types of networks together, so that users and computers in one location can communicate with users and computers in other locations. Many WANs are built for one particular organization and are private. Others, built by Internet service providers, provide connections from an organization's LAN to the Internet. WANs are often built using leased lines. At each end of the leased line, a router connects to the LAN on one side and a hub within the WAN on the other.