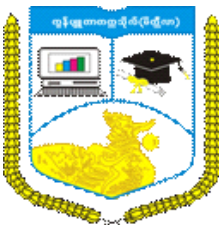

Internet Computing

Section

Journal of Research and Applications (JRA), UCSMTLA, 2019 Volume-01, Issue-01

Article ID - JRA190007

APPLYING MICROSOFT OFFICE 365 WITH AZURA ACCOUNT AND MICROSOFT OFFICE 2013

Khing Lay Naing[(1)], Soe Moe Aye[(2)], Thet Su Win[(3)]

[(1)(2)(3)]University of Information Technology (Yangon), Myanmar

[(1)]*laynaingnaing72@gmail.com*

ABSTRACT

Nowadays we should use office 365 for our work, office and our school. Some schools provide the Office 365 applications for students , teachers and Staff to achieved victory of the latest and greatest educational applications. If we have an owned account we can use **installation on** to 5 devices per user**.** So we can access emails, files and Office programs from any location on any device everywhere anytime with Mobile or other devices, if we are not at home on desktop. Office 365 is a Web-based platform that pairs the Office applications with cloud storage. Office 365 is not only a service, but also an application suite. Office 365 is a smoke-and-mirrors that are Web-based versions of the Office applications, so we can store cloud in Sky Drive we can access them seamlessly from virtually any Web-connected device.

KEYWORDS: *Office 365, office 2013, Azura account, web-based platform, Microsoft, cloud service.*

1. INTRODUCTION TO OFFICE 365 AND OFFICE 2013

Office 365 is a subscription based package that offers access to the latest desktop Office suite, Office Online, cloud storage, and premium mobile application. The main difference is that Office 365 is a **subscription based service** or Software as a Service (SaaS) [1]. A new Microsoft 365 Education device license includes Windows, in tune for Education and Office 365 Education. Office 365 is a set of cloud services available on a subscription basis from Microsoft and the ability to connect the two through the cloud and store and share files from SharePoint or One Drive. You can have access to Microsoft Office anywhere which is fantastic. If you use Office 365 you'll be using Office Online which includes Word Online, Outlook Online, Excel Online, PowerPoint Online, OneNote Online, etc [1]. Microsoft Office 365 has various subscription levels with annual commitments for the small businesses, education, government organizations and enterprises. User can have an Office 365 plan and use Office 2013 regularly, or user can have an Office 365 and only use Office Online Office 2013 describes only the desktop applications. Office 2013 is an applications suite and a standalone piece of software. A new feature for Word 2013 is the ability to drop photos into Word documents and place them wherever you want. This DTP function is complemented with the ability to annotate documents freehand with text and illustrations. Outlook 2013 offers a "new" feature that displays a one-line preview of each message in your inbox.

2. ADVANTAGES AND DISADVANTAGES OF OFFICE 365

2.1 Advantages of office 365

There are so many advantages, one of the biggest advantages of Office 365 is the ability to work from anywhere as long as user have an internet connection, because it's entirely cloud- based. So user can access their Office programs (Word, PowerPoint, Excel) and email, files from any location and any devices. It Work anywhere, easy collaboration, reduce capital spend, eliminates hardware, reduce energy costs and is updated monthly with the latest features and security updates. Use cloud-powered email to reach customers and coworkers wherever work takes user. Transform classroom time and keep students focused on learning by saving time on everything from lesson planning to tracking grades all while increasing collaboration.

One advantages is **cost effective** when it comes to paying for licenses, Office 365 is certainly the less expensive, depending on how many users are in office. Each user will have access to One Drive which depends upon the service level offer up to 1 terabyte of storage in a cloud environment. One of great advantage of the plans of Office 365 is **easy access to files** that is user can use to remotely edit their documents from any device and browser. **Email is accessible and affordable you will be** able to access your email anywhere, anytime Outlook is hosted in the cloud and Skype, SharePoint and Lync Online are the extra features available for better communication and collaboration across the business and are **Additional Tools of office 365.Another advantage is** allows user business to scale from one user to around 300 users. When their business grows, it has scalability to meet your requirements. **Business continuity** built on Microsoft Azure platform, Office 365 offers a reliable infrastructure which is secure.

There are top five benefits of Microsoft Office 365which are larger mailbox storage Share Point and one Drive Enhanced Security, Effortless Collaboration, Simplified Information Exchange, Cost Saving, Better Productivity. The 7 biggest advantages [2] of Office 365 include Users can work from anywhere, provides robust, Security and reliability, subscription-based payment is available, teams and users can easily collaborate, user receive access to the latest programs, user can work with what you know, office 365 features mix and match plans .From business point of view there are top 6 Benefits of Office 365 for business - 1. Mobility - the ability to access your data from anywhere, no matter what. 2. Security - built-in enhanced data security to protect your organization. 3. Collaboration - all the tools you need to get organized and collaborate. 4. Communication - simplified communication is the key to growth. 5. Productivity - simplified document and file sharing. 6. Business Intelligence.

2.2 Disadvantages of office 365

There are some disadvantages of office 365, their business could be a seasonal one and the recurring fee may be caused due to the budget constraints while the office 365 subscription is usually more cost-effective for many business **cost considerations. Infrastructure configuration is** less flexible and customized**. Data Security** does not reside, as with any cloud-based solution and businesses that find some unsecure option and so it may not completely satisfy requirements**. Office 365 has limited Email Archiving and eDiscovery** user might require an addition of third-party email archiving service provider. **Email quotas and limitations may need** to be thoroughly considered and the limitations need to be investigated and any workarounds or the addition of third-party vendors should be addressed if required.

3. ADVANTAGES AND DISADVANTAGES OF OFFICE 2013

3.1 Advantages of office 2013

Many advantages are similar to office 365 advantages, files are saved in the clouds such as office 365, will allow users to read documents in an easy-to-read environment. Mobile users can use the suite on their tablet without any issues or inconveniences. Simple editing can be used to edit PDF files using Office. Adding videos to your content is easy and it allows you to search for appropriate videos within the software application you're using.

3.2 Disadvantages of office 2013

Some of disadvantages of Office 2013, Office 2013 is less compatibility with files created in 2010/ 2007 , The view is similar to windows 98 , it does matter if it is 32 bit color. Adding the pictures to Microsoft Word 2013 can be a bit difficult as they often refuse to go where user want them. User can add media and images to their documents with the "live layout" feature in Word 2013. The new user interface is overly simplistic, and many people find the simplicity locking bulk. It will run only on Microsoft's Windows 7 or 8 operating systems and on Apple Mac OS X 10.6 or higher. [3] Agencies that have not upgraded to the latest versions of these operating systems may be unhappy to find that their current OS is not supported so this disadvantage is great for user.

4. USE OFFICE 365 FOR EDUCATION AND STUDENT

Microsoft Office 365 has various subscription levels with annual commitments for the small businesses, education, government organization and enterprises. There are three level for office 365 they are office365 A1 level, which is free online version of Office and includes everything you expect from Office, plus Microsoft Teams. Office 365 A3 level, this level Access to the Office desktop apps including Microsoft Teams, plus robust management and security tools [4].Office 365 A5 levelBottom of Form

, at this level, all the Office desktop application including Microsoft Teams, with best-in-class security, compliance, and analytics are includes o many points of view for office 365. Office 365 has very clear advantages for education. So we can talk about education and student points of view.

Bring learning opportunities to your community, whether it's their family, a club or their local school. Get started with these resources and tools to help students build the skills they need for the future. Tools thus save time and money and you can achieve better learning outcomes for all your student classrooms, increasing overall learner success. Create learning environments that empower students to be independent and creative learners, build reading, language and STEM skills, and prepare them for their futures, empowering every student on the planet to achieve more. Affordable, easy-to-manage technology and powerful tools for students and educators if user's laptop or mobile device is stolen or destroyed, and user can still edit a crucial client presentation even if user don't have their desktop PC with them. User can use an affordable suit of powerful tools .Give every educator and student the power of Office 365 Education on all their devices, Outlook, including Word, Excel, PowerPoint, Access, OneNote, Microsoft Teams, applications and always-accessible files update in real time and get 1 TB of free online storage and the online versions of Office [5]. For teacher, learning outcomes will be better and save teachers time. Simplify class management and create classes and groups for Teams, In tune for Education School Data Sync. Equipment will allow their students to learn a suite of skills and applications that employers value most. Cloud services to create a modern classroom, create collaborative classrooms, connect in professional learning communities in school, and communicate with school teachers and students. Run your school with confidence. Support personal learning at scale with affordable, easy-to-manage technology that delivers rigorous security and privacy protection.

5. INSTALLATION OF OFFICE 365

User can use search box type cmd, following figure will appear

C:\ windows\ system32>E: (go to location of office 365 installation folder)

E:\>cd _ sw collection (to change directory of office 365 installation file, installation folder is on the _sw collection)

E:_SW collection> cd "Office 365"

E:_SW collection\Office 365> cd x64 (user can choice X86 or X64)

E:_SW collection \Office 365\X86>setup / configure configuration.xml

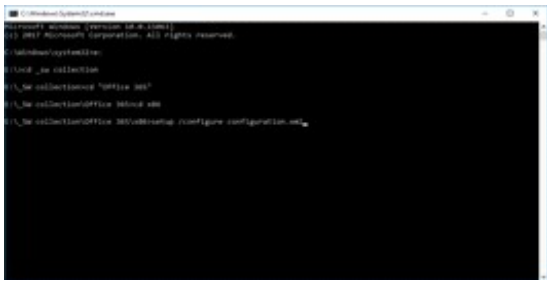

Fig 1. Installation Office 365.

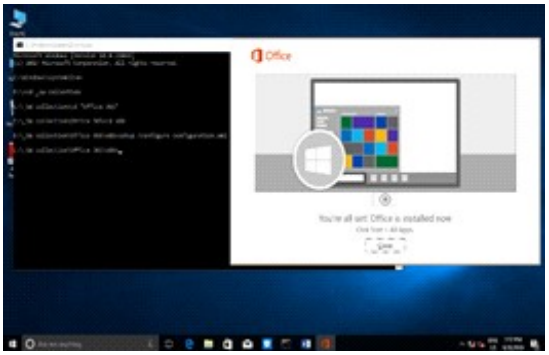

Fig 2. Installation finished click to close.

6. TO JOIN AZURA ACCOUNT FOR STUDENT

Windows 10 devices support all types of learners with Learning Tools and accessibility features. If we have an own account to join Azure for Education, following Figures can join user's own account to Azure. Students and educators are eligible for Office 365 Education for free, including Word, Excel, PowerPoint, OneNote, and now Microsoft Teams, plus additional classroom tools. All you need is a valid school email address so user get started by

just entering user school email address. Using search box, user can type setting, and then windows setting windows will appear and then click Accounts. And then click Access work or school. And then click plus sing in front of connect. Following figure you will see, you can operate yourself step by step manage your account and to joy Azura for your own account [6].

This windows is account setting windows

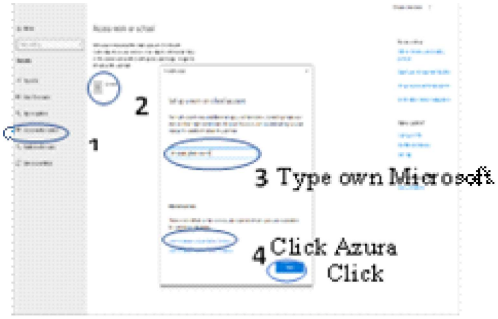

Fig3. Account setting windows

This window retypes your own account

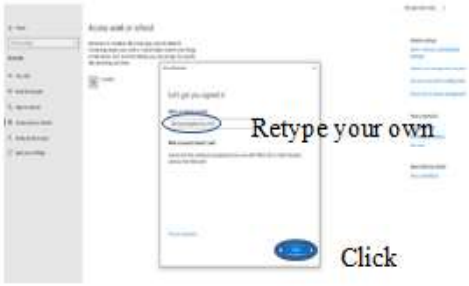

Fig 4. Account setting windows retype user own account

This windows user type password

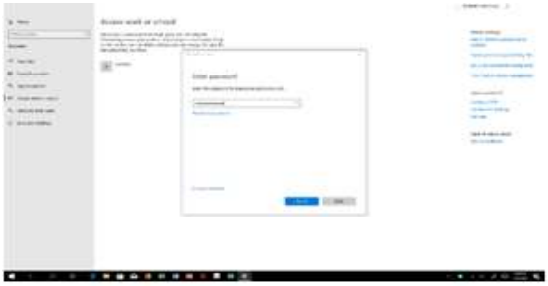

Fig 5. Type user login password

This windows is join to Azura account

Fig 6. Click join to joining the Azura account.

This windows is user click the done to join account.

Fig7. Click done to finished joining

Fig 8. Azura account join succeed

This windows is user's profile user can change something for their want (exampl.their photo and others).

Fig 9. User can edit this user profile windows

Being built on Microsoft Azure platform, Office 365 offers a reliable infrastructure which is secure and reliable. Students and educators can get the developer tools and learning resources they need to build cloud-based skills. Students jump-start their careers and innovation with free access to Azure, developer tools and learning resources. Educators, Professors, teachers and teaching assistants get access to open-source content for classes in Azure credits, plus free services.

Institutional students for cloud-based tech careers with Azure. Provide professional developer tools, software, services and educational content to your faculty and students with a low-cost subscription to Azure tools for Teaching. Help students in your community to build cloud skills. Bring learning opportunities to your community, whether it's your family, a club or your local school. Get started with these resources and tools to help students build the skills they need for the future. Skype, SharePoint and Lync Online are the extra features available in Office 365.

7. CONCLUSIONS

In the world, not everything will be perfect. Some software and programming are also not perfect. Office 2013 and office 365 have advantages and disadvantages but user can choose after checking the disadvantages of office. We suggest users should choice office 365 because that office has a little less disadvantage than other offices. Microsoft office 365 is also much more convenient than other offices who played a role in the making of this paper. Lastly I thank a great billion to all who are really thankful.

ACKNOWLEDGEMENT

Firstly I would like to thanks our rector, pro-rector, all professors and associate professors, all teachers and staff in our university. Secondly I would like to offer my greatest thanks to everyone.

REFERENCES

[1] "How Your School Can Benefit from Office 365 for Education | Mindsight." [Online]. Available: https://gomindsight.com/insights/blog/microsoft-office-365-education/. [Accessed: 12-Dec-2019].

[2] "7 Benefits Of Office 365 For Small Business," *Sherweb*, 22-Dec-2015. .

[3] D. S. D. S. is the author of two books on computer networking and A. with Thous, "Office 2013 Professional Review," *Technology Solutions That Drive Government*. [Online]. Available: https://fedtechmagazine.com/article/2013/10/product-review-microsoft-office-2013. [Accessed: 12-Dec-2019].

[4] "Compare Office 365 Education Plans." [Online]. Available: https://www.microsoft.com/en-us/microsoft-365/academic/compare-office-365-education-plans. [Accessed: 12-Dec-2019].

[5] "What are the advantages and disadvantages of Microsoft Office 365 – Synergetics India." [Online]. Available: https://synergetics1.wordpress.com/2016/12/08/what-are-the-advantages-and-disadvantages-of-microsoft-office-365/. [Accessed: 12-Dec-2019].

[6] JiangChen79, "Sign up for Azure with Office 365 account." [Online]. Available: https://docs.microsoft.com/en-us/azure/billing/billing-use-existing-office-365-account-azure-subscription. [Accessed: 12-Dec-2019].

[7] Microsoft India, "50 Ways to Use Office 365 for Education," 03:42:51 UTC.

[8] "Free Microsoft Office 365 for Schools & Students | Microsoft Education." [Online]. Available: https://www.microsoft.com/en-us/education/products/office?ms.officeurl=students. [Accessed: 12-Dec-2019].

[9] A. Lacey, "What is The Difference Between Office 365 and Office 2013?" [Online]. Available: https://learn.filtered.com/blog/what-is-the-difference-between-office-365-and-office-2013. [Accessed: 12-Dec-2019].

Journal of Research and Applications (JRA), UCSMTLA, 2019 Volume-01, Issue-01

Article ID - JRA190032

OPEN SHORTEST PATH FIRST (OSPF) ROUTING PROTOCOL SIMULATION

Thiri Mon [(1)], May Thandar Oo[(2)], May Phyo Ko[(3)]

[(1)(2)(3)]University of Computer Studies (Meiktila), Myanmar

[(1)]*thirimonhkl@gmail.com*

ABSTRACT

Routing protocols are the family of network protocols that enable computer routers to connect with each other and in turn to intelligently forward traffic between their respective networks. Among routing protocols, Open Shortest Path First (OSPF) is an open standard routing protocol. OSPF has been used by a wide variety of network vendors. OSPF is a Dijkstra least-cost path algorithm and a link-state protocol that uses flooding of link-state information. In OSPF, a router constructs the entire autonomous system's a complete topological map (that is, a graph). The router determines a shortest-path tree to all *networks*, with itself as the root node by running Dijkstra's shortest-path algorithm. This paper presents the simulation of OSPF and uses GNS3 to build the simulation.

KEYWORDS: *OSPF, Dijkstra Algorithm, Link-State Protocol, VLSM*

1. INTRODUCTION

OSPF is configured on the network for the packets to reach the destination through the shortest path [1]. OSPF is a dynamic, classless and hierarchical routing protocol designed to support routing in TCP/IP networks. OSPF provides many features such as minimizing routing update traffic, allowing scalability, consisting of areas and autonomous systems, supporting VLSM/CIDR, allowing multi-vendor deployment (open standard) and having unlimited hop count.

2. OPEN SHORTEST PATH FIRST (OSPF)

The OSPF protocol must itself implement functionality such as reliable message transfer and link-state broadcast. The link state is the description of the interface of the router (IP address of the interface, mask, type of network, routers connected to) and the relationship to other routers [2]. In OSPF, a router broadcasts routing information to *all* other routers in the autonomous system, not just to its neighboring routers. Whenever there is a change a router transmits link-state information. It also broadcasts a link-state periodically (at least once every 30 minutes), even if there is no change. OSPF advertising is included in OSPF messages which are transmitted directly via IP. The OSPF protocol also checks that links are operational (via a HELLO message that is sent to an attached neighbor) and allows an OSPF router to obtain a neighboring router's database of network-wide link state [3]. Unlike other routing protocols, such as Routing Information Protocol (RIP) that uses Bellman-ford vector based algorithms, OSPF introduces new concepts, such as areas, Variable Length Subnet Mask (VLSM), and route summarization.

An autonomous OSPF system can be hierarchically configured into areas. Each area has its own OSPF connection-state routing algorithm, with each router in an area transmitting its link status to all other routers in that area. One or more area border routers are responsible for routing packets outside the area within each area. Lastly, exactly one OSPF area in the AS is configured to be the backbone area. The backbone area's primary role is to route traffic in the AS between the other areas. The backbone always includes all border routers in the AS and can also include non-border routers. Inter-area routing within the AS requires that the packet be first routed to an area border router (intra-area routing), then routed through the backbone to the area border router that is in the destination area, and then routed to the final destination [3]. The reasons for creating OSPF in a hierarchical design are to

decrease routing overhead, speed up convergence, and confine network instability to single areas of the network.

3. TOPOLOGY FOR CONFIGURING OSPF IN GNS3 SIMULATOR

The topology consists of three routers (RouterA, RouterB & RouterC), two PCs (PC-1 & PC-2) and connecting wires. This topology is show in Fig 1. In this topology, PC-1 passes through three different networks and then can connect to PC-2 by using routing protocol. So, OSPF routing protocol is configured in three routers. The configurations of three routers are shown in as follow.

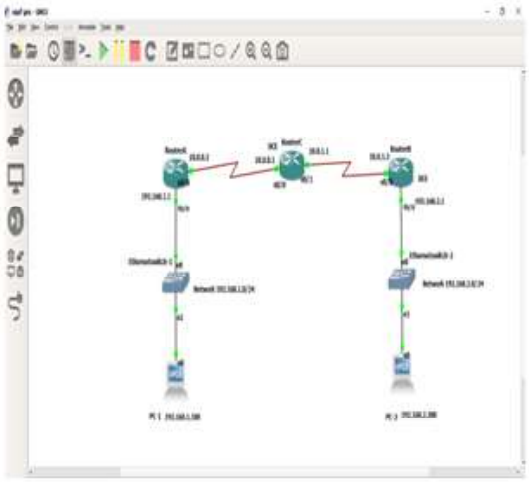

Fig 1. Topology for Configuration

3.1 General Configuration of Three Routers (X)

After designing the topology, the configuration of OSPF starts on on RouterA, RouterB and RouterC. IP addresses will be assigned to the PCs (end devices). Router name X represents for Router (A or B or C). x defines for Interface of routers. xx represents ip address of router interfaces. The OSPF process-id is a numeric value local to the router. It does not have to match process-ids on other routers. This process-id is defined y in this general configuration. The following command lines are general for three routers configurations.

Router>en

Router# conf t

Router(config)#hostname RouterX

RouterX(config)#int s0/x

RouterX(config-if)#ip add 10.0.xx.xx 255.255.255.252

RouterX(config-if)#no shut

RouterX(config-if)# int f0/x

RouterX(config-if)#ip add 192.168.xx.xx 255.255.255.0

RouterX(config-if)#no shut

RouterX(config-if)# exit

RouterX(config)#router ospf y

RouterX(config-router)#router-id 10.0.xx.xx

RouterX(config-router)#network 10.0.xx.xx 0.0.0.3 area 0

RouterX(config-router)#network 192.168.xx.xx 0.0.0.255 area 0

RouterX(config-router)#^Z

RouterX#

RouterX#wri mem

Building configuration...

[OK]

3.1.1 Assigning IP Addresses for Three Routers

In RouterA, IP addresses are assigned for two interface FastEthernet0/0 and interface Serial0/0. In f0/0, IP address is assigned as 192.168.1.1 and subnet mask is assigned as 255.255.255.0. In s0/0, IP address is assigned as 10.0.0.2 and subnet mask is assigned as 255.255.255.252. The assigning IP address of RouterA is shown in Fig2.

In RouterB, IP addresses are assigned for two interface FastEthernet0/0 and interface Serial0/0. In f0/0, IP address is assigned as 192.168.2.1 and subnet mask

is assigned as 255.255.255.0. In s0/0, IP address is assigned as 10.0.1.2 and subnet mask is assigned as 255.255.255.252. The RouterB assigning IP address is shown in Fig 3

```
interface FastEthernet0/0
 ip address 192.168.1.1 255.255.255.0
 duplex auto
 speed auto
!
interface Serial0/0
 ip address 10.0.0.2 255.255.255.252
 clock rate 2000000
```

Fig 2. Assigning IP address of RouterA in GNS3

```
interface FastEthernet0/0
 ip address 192.168.2.1 255.255.255.0
 duplex auto
 speed auto
!
interface Serial0/0
 ip address 10.0.1.2 255.255.255.252
 clock rate 64000
```

Fig 3. Assigning IP address of RouterB in GNS3

In RouterC, IP addresses are assigned for two interface Serial0/0 and interface Serial0/1. In s0/0, IP address is assigned as 10.0.0.1 and subnet mask is assigned as 255.255.255.252. In s0/1, IP address is assigned as 10.0.1.1 and subnet mask is assigned as 255.255.255.252. The IP address of RouterC configuration is shown in Fig 4.

```
interface Serial0/0
 ip address 10.0.0.1 255.255.255.252
 clock rate 64000
!
interface FastEthernet0/1
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface Serial0/1
 ip address 10.0.1.1 255.255.255.252
 clock rate 2000000
```

Fig 4. Assigning IP address of RouterC in GNS3

3.1.2 OSPF Configuration for Three Routers

The process-id is 10 to start OSPF and router-id is 10.0.0.2 in RouterA. There are two directly connected networks from RouterA. The allowable networks are defined as 10.0.0.0 and 192.168.1.0 in area 0. The process configuration is shown in Fig 5.

```
router ospf 10
 router-id 10.0.0.2
 log-adjacency-changes
 network 10.0.0.0 0.0.0.3 area 0
 network 192.168.1.0 0.0.0.255 area 0
!
```

Fig 5. OSPF Configuration of RouterA in GNS3

The process-id is 2 to start OSPF and router-id is 10.0.1.2 in RouterB. There are two directly connected networks from RouterB. The allowable networks are defined as 10.0.1.0 and 192.168.2.0 in area 0. Fig 6 shows the RouterB OSPF configuration.

```
router ospf 2
 router-id 10.0.1.2
 log-adjacency-changes
 network 10.0.1.0 0.0.0.3 area 0
 network 192.168.2.0 0.0.0.255 area 0
!
```

Fig 6. OSPF Configuration of RouterB in GNS3

The process-id is 3 to start OSPF and router-id is 10.0.0.1 in RouterC. There are two directly connected networks from RouterC. The allowable networks are defined as 10.0.0.0 and 10.0.1.0 in area 0. The OSPF configuration of routerC is shown in Fig 7.

```
router ospf 3
 router-id 10.0.0.1
 log-adjacency-changes
 network 10.0.0.0 0.0.0.3 area 0
 network 10.0.1.0 0.0.0.3 area 0
!
```

Fig 7. OSPF Configuration of RouterC in GNS3

3.1.4 PC-1 and PC-2 Configuration

IP addresses are assigned to PCs (end devices). The procedure of assigning IP address for PCs is shown as in Fig 8 and Fig 9.

PC-1> ip 192.168.1.100 255.255.255.0 192.168.1.1

Fig 8. Configuration of PC-1 in GNS3

PC-2> ip 192.168.2.200 255.255.255.0 192.168.2.1

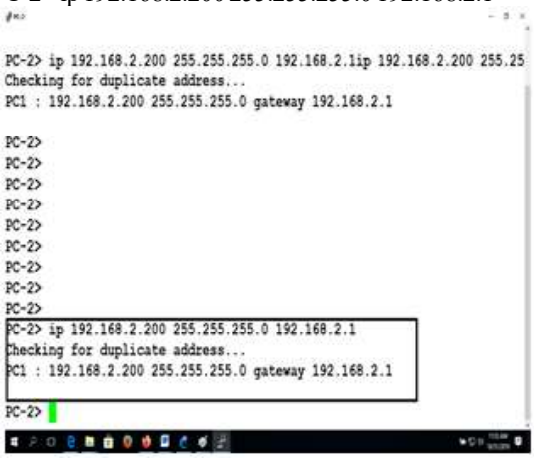

Fig 9. Configuration of PC-2 in GNS3

4. SIMULATION RESULT

After the routers and PCs have been configured, PC-1 and PC-2 ping with each other to check the connection as shown in Fig 10 and Fig 11. When PC-1 pings PC-2 by using this command (PC-1>ping 192.168.2.200), PC-1 firstly passes through to RouterA, next route is RouterC and RouterB. Finally PC-1 reaches the destination (PC-2).

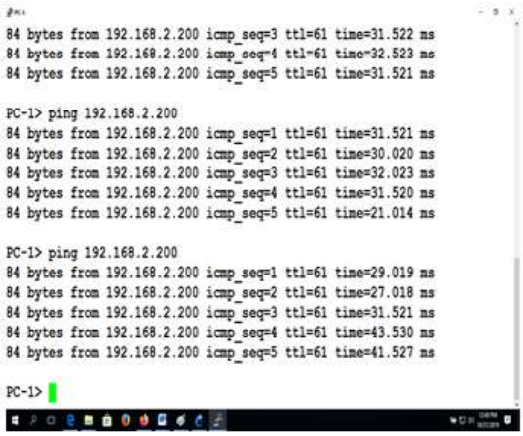

Fig 10. Ping Test from PC-1 to PC-2

When PC-2 pings PC-1 by using this command (PC-2>ping 192.168.1.100), PC-2 firstly passes through to RouterB, next route is RouterC and RouterA. Finally PC-2 reaches the destination (PC-1

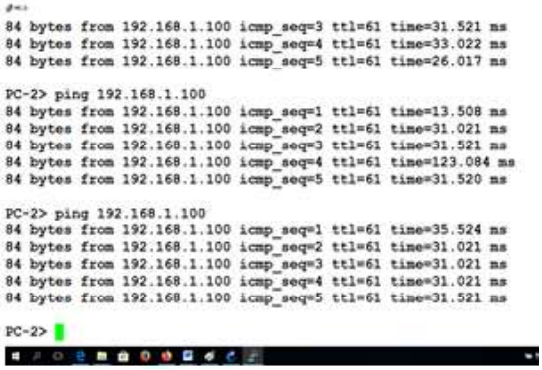

Fig 11. Ping Test from PC-2 to PC-1

Fig 10 and Fig 11 indicate that ping test is successful between PC-1 and PC-2 by using OSPF routing protocol. So, OSPF configuration is successful on the routers between PC-1 and PC-2.

And then, when the serial links between the routers are captured by using Wireshark packet analyzer, a HELLO Packet is sent to each attached neighbor router as shown in Fig 12 and Fig 13. So, the routers establish and confirm network adjacency relationships

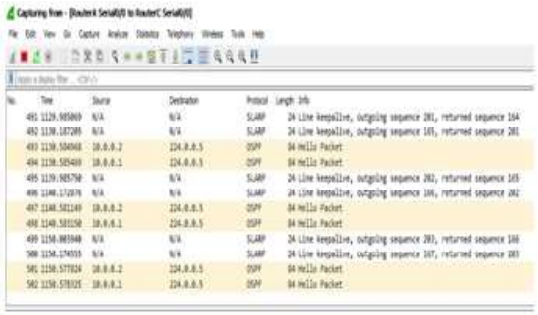

Fig 12. Capturing from RouterA to RouterC

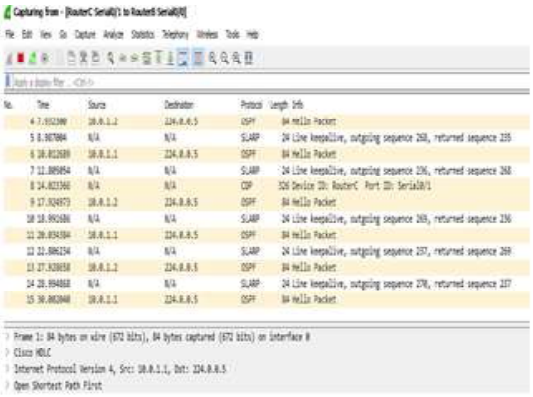

Fig 13. Capturing from RouterC to RouterB

5. CONCLUSIONS

Building a communication network consists of routers at different nodes. These routers are configured with OSPF to effectively forward / route the packet along the network to intended destination by calculating the best shortest path. In this paper, the simulation of OSPF Routing Protocol shows PC's ping results. ICMP packets successfully echoed reply across the network during PING.

REFERENCES

[1] Prof. Pravin. V. T. Prof. Manjusha. M. Patil1 Prof. Sagar. R. Deshmukh3 &. Prof. Pranali. P. Chavhan4, "SIMULATION OF OSPF ROUTING PROTOCOL AND IP TRAFFIC MANAGEMENT WITH ACCESS CONTROL LIST (ACL) USING CISCO PACKET TRACER," *Glob. J. Eng. Sci. Res.*, vol. [NC-Rase 18], pp. 139–151, Nov. 2018.

[2] S. U. R. Malik, S. K. Srinivasan, S. U. Khan, and L. Wang, "A Methodology for OSPF Routing Protocol Verification," p. 5.

[3] J. F. Kurose, *Computer Networking. James F. Kurose, Keith W. Ross*, 6 edition. Boston, Mass.: Pearson Education, 2012.

Journal of Research and Applications (JRA), UCSMTLA, 2019 Volume-01, Issue-01

Article ID - JRA190051

DEVELOPMENT OF STUDENTS' INFORMATION SYSTEM USING ADO.NET TECHNOLOGY AND MICROSOFT SQL

Thandar Htwe [(1)], Myintzu Phyo Aung[(2)]

[(1)]University of Computer Studies (Myitkyina), Myanmar

[(2)]Myanmar Institute of Information Technology (MIIT), Myanmar

[(1)]thandahtwe1@gmail.com

ABSTRACT

Nowadays, managing student related information manually in a university has become tedious and most of them are being computerized. Therefore, the computerization of student information system for a university plays an important role in achievements of education sector. It stores and tracks all student data which are needed by all faculty and staff to manage the activities and operations of the university. Information such as grades, attendance records, admission information, and financial transactions are tracked through the system. This paper presents the development of student information system for a university applying ADO.Net and Microsoft SQL technologies to support not only faculties but also staffs in order to manage the university's operations efficiently. Moreover, the experiments are made using Microsoft C#. Net and Microsoft SQL Server 2013.

KEYWORDS: ADO .Net, C# .Net, SQL Server, Student Information System

1. INTRODUCTION

Information that an institution collects or gathers would help making decisions that would benefit their organization in the era of computer technologies. Because of this, database systems are now used by many organizations that can help in storing data. It is a reliable data storage and retrieval. With the help of computers, data management and analysis is faster and easier than a manually managed data. At present, the number of university students are increasing, the management of student information is crucial. The current paper based work is tedious and not efficient.

An information system is a working system that is processes and activities of information system is for capturing, transmitting, and storing, retrieving, manipulating, and displaying information. Thus, information systems provide informational products for customers of internal and external of organization using information, technology and other resources [1].

Student information system (SIS) is a one type of management information system which can help in education establishments for managing student data. Student information systems can provide services and capabilities for registering students in specific courses; keeping results of tests and scores of assessments, keeping student grades and transcripts, building student schedules; tracking student attendance; managing many other student-related data needs in a university. For the development of Higher Education Institutions, Student Information System plays an important role for the academic decision making purpose and other academic tasks. Because of the development of Science and Technology, information is essential in our daily life.

This study aims to develop and maintain a functional, reliable, usable, efficient, maintainable and secure student information system. This system will be able to help the Register and staffs of student affair department of the University of Computer Studies, Myitkyina to reduce the tasks mainly on the delivery of enrolment procedures and the keeping of student records and to eliminate the problems of the current manual system.

2. RELATED WORK

A new type of information management system is presented in [2]. That system is implemented for identification and management of students based on fingerprint identification. The two parts in their work are terminal and host. The fingerprint identification module is composed in terminal part with the micro controller. As the host computer , personal computers or large servers can be used according to the number of users. SQL server was used for storing and managing of student information. The terminal fingerprint sensor uses optical fingerprint recognition module, while the microcontroller uses STM32F4 with 192 KB of SRAM. The fingerprint identification sensor collects the finger print information and the microprocessor processes and encrypts the fingerprint information before transmitting it to the server.

Student Information and Score Management System (SISMS) presents in [3]. It can be used for maintaining students' records in universities and educational institutions or colleges.

Role of Information Systems in a University Setup is presented in [4]. In modern knowledge societies, knowledge is power. Therefore, information plays the important role in any organization and management of information is one of the major activities amongst various activities in today's world.

The work in [5] presented a Student Information System for Kalinga State University. Their study was intended for the improvement of the efficiency of the existing Student Information System of Kalinga State University Rizal campus. The system in [5] tried to meet the five requirements; reusability, maintainability, security, usefulness and functionality and evaluation on the system appeal of a quality software only to a moderate extent.[6] provides automated web-based management system for college and student information using web and Microsoft SQL technologies. Their system facilitates the stored information in repository can be accessed at any time for users.

3. STUDENT INFORMATION SYSTEM

Among the resources of a university, Information Systems (IS) have become a basic one and plays an important role for all the stakeholders. That is because of the need for collecting of data, storing of data processing and transmission of information, information systems are important in any organization. Here, universities need the information systems which are able for storing, updating and deleting of student data through a simple interface.

In the existing system, all actions are written down. The students have to write down their personal information in the registration from every time they enroll, and pass the records to register and accounting division. The purpose of this paper is to present the development of student information system for computerized record keeping of student information and future for online student registration system.

The system presented in this paper is in order to replace the current manually and paper based student registration and record keeping process in Student Affairs Department of University of Computer Studies, Myitkyina, shown in Figure 1, Student Information System.

The system is intended to be used by the register and some authenticate staff of student affair department. Therefore, the authentication process must be success to access the system. The authenticated user can add, edit or delete student records, teacher's information and subject records. Figure 2 shows the student database of the student information system. It can also be helpful for the creating time table because teaching information for each teacher is kept in this table.

4. APPLIED TECHNOLOGIES

With the development of Science and technology, the information system is essential in our daily life. It is needed to replace the existing manual work with the computerized system for student registration. The system presented in this paper used the RDBMS and ADO .NET to implement the information system for students of University of Computer Studies, Myitkyina.

4.1 ADO.NET

ADO .NET is a very important feature of .NET framework which is used to work with data that are, stored in the database, such as Microsoft SQL files. ADO DOT NET is a set of classes that expose data access services for .NET Framework. ADO .NET can be represented as a set of computer software components that are mainly used to access data and the data services which are based on the disconnected Datasets and the XML. It is also a part of the base class library which includes the Microsoft .NET Framework. ADO .NET contains a number of

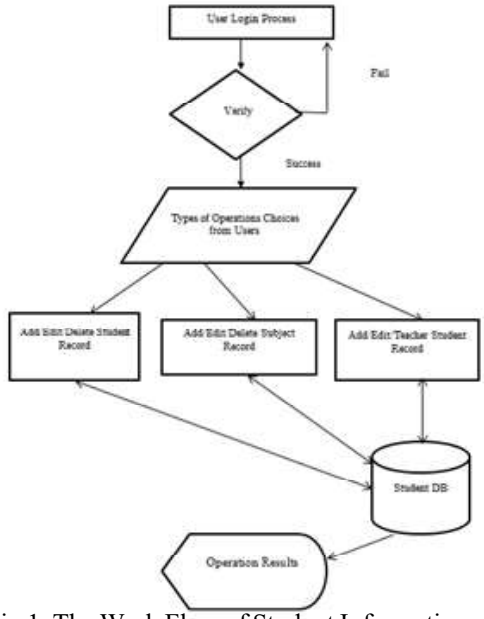

Fig 1. The Work Flow of Student Information System

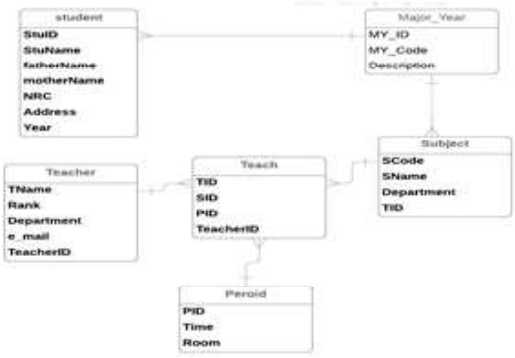

Fig 2. Database Design of the system

classed that provides various methods and attributes to manage the communication between the applications and the data sources. ADO .NET provides a set of features, such as connection and commands that can be used to develop the highly efficient data services and many other important services in .NET applications [7].

4.2 RDBMS

RDBMS stands for the Relational Database Management System which is the basis of SQL and all the modern database system such as the MS SQL server, IBMDB2, Oracle, MySQL and Microsoft Access. Most RDBMS use the SQL language to access the database [8].

4.3 SQL Statements

SQL is mainly used to communicate with the database. It is the standard language for relational database management systems. SQL statements are mainly used to perform the task such update the data on a database, or to retrieve the data from a database [9].

5. IMPLEMENTATION OF THE SYSTEM

5.1 Login Process

In the Login page, the user needs to fill the security information (such as User Name and Password) to access the system. If the User Name and Password is correct, the user can enter to the Selection Page.

Fig 3. Login Page

5.2 Selection Process

From the Selection Page, the user can choose to go to Insert Page, Update Page, Delete Page and Show Page for insertion, updating, deleting of student information.

5.3 Insert Process

Student Information such as student name, roll number, DOB, address, class etc. can be added by using Insert Page.

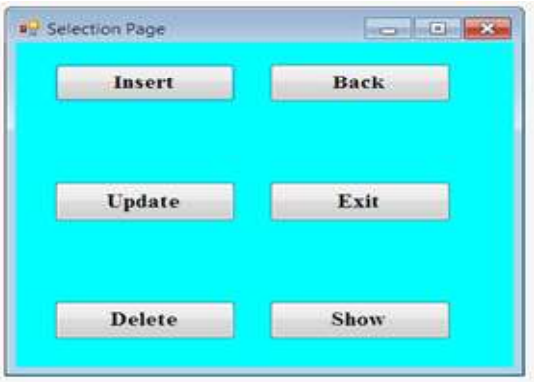

Fig 4. Selection Page

Fig 5. Insert Page

5.4 Update Process

In **Update Form,** student information such as "Address" can be updated by using student's roll number.

Fig 6. Update Page

5.5 Delete Process

In **Delete Form**, student's information can be deleted by using student's roll number.

Fig 7. Delete Page

5.6 Show Details Process

In the **Show Details Form**, detail information of students' can be seen by clicking the show detail button.

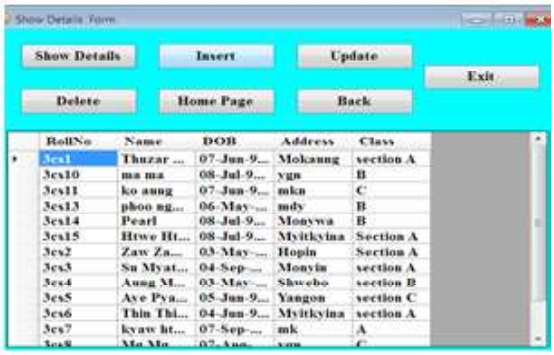

Fig 8. Show Detail Page

6. CONCLUSION

According to the development of modern Information and Communication Technologies (ICT), there is a need for the academic world to enter the era of information society. There are many systems available for universities such as academic management system, examination system, online learning systems, stu-

dent information system, faculty information system etc. The main idea of these all systems is to capture the relevant data representing and visualizing them in accordance with the requirement of the users. In this paper, student information system is developed to maintain the information and other contents of a digitized Information using ADO .NET and Microsoft SQL technologies. This system is mainly intended for the staffs from student affair department and faculties in university. Currently, this system is intended for authenticated staffs of student affair department for their academic activities. In future works, this system will be extended for online student registration and management system.

REFERENCES

[1] S. Alter, "Defining Information Systems as Work Systems: Implications for the IS Field," *Eur. J. Inf. Syst.*, pp. 448–469, Jan. 2008.

[2] P. Yang, G. Sun, J. He, P. Zhou, and J. Liu, "A Student Information Management System Based on Fingerprint Identification and Data Security Transmission," *Journal of Electrical and Computer Engineering*, 2017. [Online]. Available: https://www.hindawi.com/journals/jece/2017/9598581/. [Accessed: 13-Dec-2019].

[3] D. M. Dalgade, A. Pandey, G. Negi, and N. Popat, "A RESEARCH PAPER ON STUDENT INFORMATION AND SCORE MANAGEMENT SYSTEM (SISMS)," vol. 2, no. 2, p. 4, 2016.

[4] S. Gupta, A. Kumar, and R. Bhatnagar, "Role of Information Systems in an University Setup – A Case Study," vol. 4, no. 3, p. 6, 2016.

[5] "Student Information System for Kalinga State University-Rizal Campus - PDF Free Download." [Online]. Available: https://docplayer.net/60653042-Student-information-system-for-kalinga-state-university-rizal-campus.html. [Accessed: 13-Dec-2019].

[6] S. S. Rajmane, S. R. Mathpati, and J. K. Dawle, "Digitalization of Management System for College and Student Information," *Res. J. Sci. Technol.*, vol. 8, no. 4, p. 179, 2016.

[7] A. J. Lendvai and H. Shi, "ADO and ADO.NET Object Model Comparisons: A Relational Perspective," p. 8, 2007.

[8] I.-S. Stroe, "MySQL databases as part of the Online Business, using a platform based on Linux," no. 3, p. 10.

[9] " http://www.sqlcourse.com/intro.html - Google Search." [Online]. Available: https://www.google.com/search?client=firefox-b-d&q=9%09http%3A%2F%2Fwww.sqlcourse.com%2Fintro.html

Journal of Research and Applications (JRA), UCSMTLA, 2019 Volume-01, Issue-01

Article ID - JRA190061

CLASSIFICATION OF NAT AND PAT WITH SIMULATION

Aye Aye Mar [1], Lei Yee Kyaw[2], Thiri Mon[3]

[(1)(2)(3)]University of Computer Studies (Meiktila), Myanmar

[(1)]*ayeayemar.aam118@gmail.com*

ABSTRACT

Today, every person is used the electronic device which it is connect to internet. So Network Address Translation (NAT) is needed for routing system. NAT enable the whole network to access the internet using one single real IP address. Port Address Translation is a type of Network Address Translation when there is a shortage of public IP address. When overloading of NAT, a computer is used the PAT. It is used a single external public address and maps multiple internal addresses using various port numbers. In recent years, simulation has become more and more popular among computer network researchers around the world. It is also important to ensure that the simulator results are accurate and credible. In this paper by using simulation tool (Cisco Packed Tracer), static NAT, dynamic NAT and PAT methods classification, to describe different global address when inside network to outside global network. Define the router configuration and using different command line.

Keywords: PDU, NAT, PAT, IPV4.

1. INTRODUCTION

Devices can be access to internet with public address. Public IP address can route on the internet. Internet is the collection of Local Area Network. In the LAN network, devices used the private IP address and these addresses cannot be routed to the internet. Network Address Translation (NAT) translates between Private and Public IP address. Port Address Translation (PAT) is another type of dynamic NAT that, using a technology known as Port Address Translation, can map multiple private addresses to a single public IP address.

2. NETWORK ADDRESS TRANSLATIONN (NAT)

Every IP-capable machine needs a public IP address to connect to the internet. A small office, home office (SOHO) wants to install a LAN to connect multiple machines and a large number of IP address need to be allocated by ISP to cover all of SOHO devices. If the subnet grew bigger, a larger block of addresses would have to be allocated. To solve this problem used NAT router to represent the private address to the rest of the internet. The NAT router, when the packet leaves the private organization, updates the source IP address of the packet and changes the destination address of each packet returned to the private network. The NAT-enable router does not look like a router to the outside world. NAT router behaves to the outside world as a signal device with a single IP address. NAT router masks home network information from the outside world. If all datagrams that arrive from the WAN on the NAT router have the same IP address for the destination. The trick is to use a NAT router translation table.

3. NAT TERMINOLOGY

Network Address Translation (NAT) allows users to access the internet by sharing one or more public IP address. An IP address is either local or global. Local IPV4 address are seen in the inside network. In the external network, global IPV4 addresses are seen. As shown in figure 1.

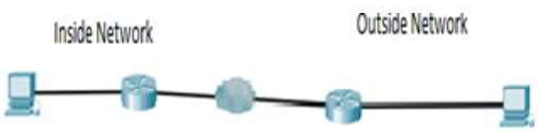

Fig1. NAT Terminology

Inside Local- The term inside refers to an address of a host inside an enterprise in a typical NAT design. An inside local is the actual IP address assigned to a host in the private enterprise network. A more descriptive term might be inside private, because oftentimes, the inside address are also private addresses.

Inside global- The term inside refers to an address of a host inside an enterprise in a typical NAT design. NAT uses an inside global address to represent the host as the packet is sent to the outside network, typically the internet NAT router changes the inside host's source IP address as the packet goes from the inside to the outside network.

Outside global - The term outside refers to an address used for a host in the internet in a typical NAT design. An external global address is the actual IP address assigned to an external network host. A more descriptive term may be external to the public, since the external global address is the external host with a public IP address that can be used for public internet routing. Outside local NAT can translate the outside IP address, the IP address that represents the host outside the enterprise network. When a NAT router forwards a packet from the inside network to the outside, when using NAT to change the outside address, the IP address that represents the outside host as the destination IP address in the packet is called the outside local address.

4. TOPOLOGY FOR CONFIGURING

Using NAT terminology, the enterprise network that uses private address, needs NAT, is the "inside" part of the network. The NAT function's internet side is the "outside" part of the network. The topology consists of three pc's (PC0, PC1 &PC2), one server (server0), two switch's (2950-24), two routers (1841) and connecting wires. R0 is assumed to be connected to ISP & R1 on the WAN side. This topology is show in figure 2.

5. CONFIGURATION OF STATIC NAT FOR THE CONSIDERTION TOPOLOGY

Static NAT is used for server side configuration. Static NAT is useful when a network device must be accessible from the internet within a private network. After constructing the network and making connections as described in the above figure, IP addresses will be assigned to the pc's (end devices) and Server. As show in figure 3 and figure 4.The procedure for the same are PC1 and Server0.

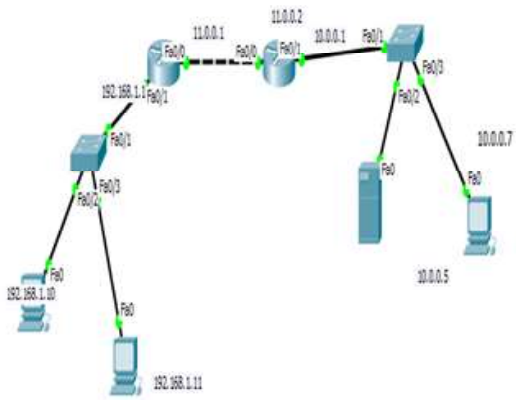

Fig 2.Topology for Configuration

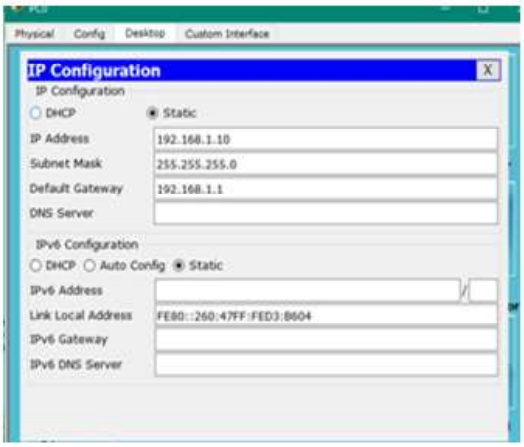

Fig 3.Assigning IP address for PC0

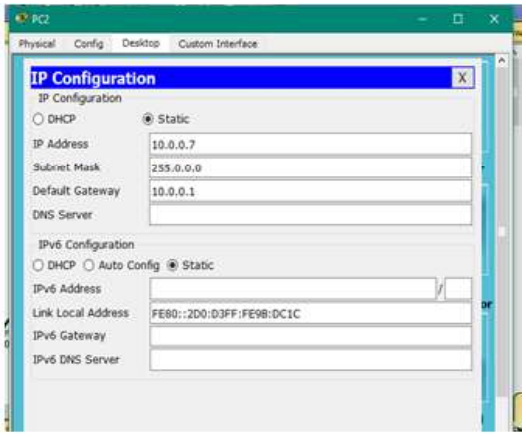

Fig 4.Assigning IP address for PC2

5.1 Router 0 Configuration

Router>en

Router# conf t

Router(config)#int fa 0/1

Router(config-if)#ip add 192.168.1.1 255.255.255.0

Router(config-if)#no shut

Router(config-if)#exit

Router(config)#int fa 0/0

Router(config-if)#ip add 11.0.0.1 255.0.0.0

Router(config-if)#no shut

Router(config-if)#

Router(config-if)#exit

Router(config)#router rip

Router(config-router)#network 192.168.1.0

Router(config-router)#network 11.0.0.0

Router(config-router)#^Z

Router#

Router(config)#ip nat inside source static 192.168.1.10 11.0.0.5

Router(config)#int fa 0/1

Router(config-if)#ip nat inside

Router(config-if)#int fa 0/0

Router(config-if)#ip nat outside

Router(config-if)#^Z

Router#

Router(config)#ip nat inside source static 192.168.1.11 11.0.0.7

Router(config)#int fa 0/1

Router(config-if)#ip nat inside

Router(config-if)#int fa 0/0

Router(config-if)#ip nat outside

Router(config-if)#^Z

Router#

5.2 Router 1 Configuration:

Router>en

Router# conf t

Router(config)#int fa 0/0

Router(config-if)#ip add 11.0.0.2 255.0.0.0

Router(config-if)#no shut

Router(config)#int fa 0/1

Router(config-if)#ip add 10.0.0.1 255.0.0.0

Router(config-if)#no shut

Router(config-if)#exit

Router(config)#router rip

Router(config-router)#network 11.0.0.0

Router(config-router)#network 10.0.0.0

Router(config-router)#^Z

Router#

Router#write

After configuring the topology as per the instructions written above, the routing of packets is checked in simulation mode in packet tracer.

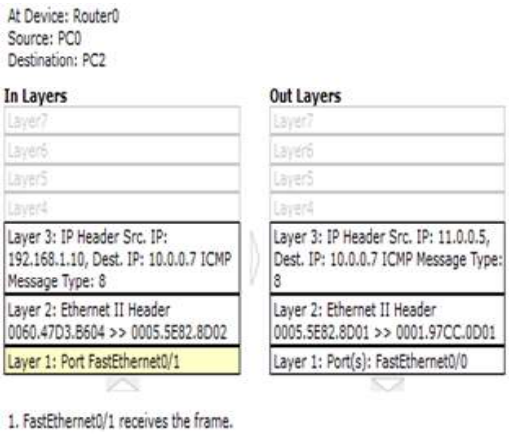

Fig5. PDU information for PC0 to Router0

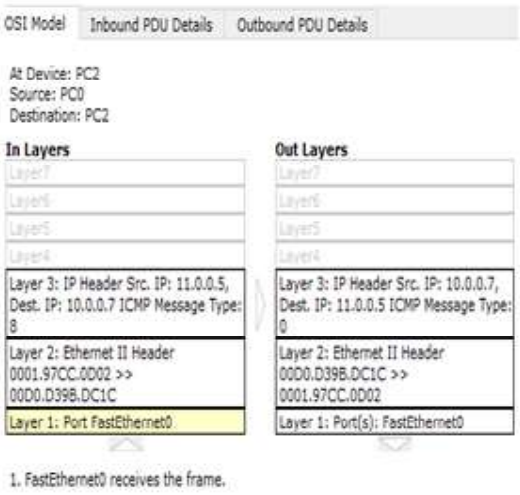

Fig6.PDU Infromati0n for PC0 to PC2

The above figures 5 and figure 6 indicate how the source and destination IP addresses get changed at various stages. The following information can be checked clicking on the message packet at router0 (ISP) and at router 1 (WAN). Similarly the PDU information for PC1 can be verified.

6. CONFIGURATION FOR DYNAMIC NAT

Dynamic NAT uses a pool of global addresses to dynamically convert client outbound traffic behind a network allowed by NAT. The router is provided with pool of IPs that contains global IPs, so every time when a user tries to access a public network it will be provided with an IP from the pool. Consider the topology as defined in figure 2. After making the connections and assigning the ip address on PC's, the configuration of dynamic NAT will be done on Router0 (ISP). The process is as follow.

6.1 Router0 Configuration.

Router>en

Router# conf t

Router(config)#int fa 0/1

Router(config-if)#ip add 192.168.1.1 255.255.255.0

Router(config-if)#no shut

Router(config-if)#exit

Router(config)#int fa 0/0

Router(config-if)#ip add 11.0.0.1 255.0.0.0

Router(config-if)#no shut

Router(config-if)#

Router(config-if)#exit

Router(config)#router rip

Router(config-router)#network 192.168.1.0

Router(config-router)#network 11.0.0.0

Router(config-router)#^Z

Router#

Router(config)#ip nat inside source list 1 pool networking

Router(config)#access-list 1 permit 192.168.1.0 0.0.0.255

Router(config)#ip nat pool networking 11.0.0.10 11.0.0.50 netmask 255.0.0.0

Router(config)#int fa 0/1

Router(config-if)#ip nat inside

Router(config-if)#int fa 0/0

Router(config-if)#ip nat outside

Router(config-if)#^Z

Router#

6.2 Router 1 Configuration

Router>en

Router# conf t

Router(config)#int fa 0/0

Router(config-if)#ip add 11.0.0.2 255.0.0.0

Router(config-if)#no shut

Router(config)#int fa 0/1

Router(config-if)#ip add 10.0.0.1 255.0.0.0

Router(config-if)#no shut

Router(config-if)#exit

Router(config)#router rip

Router(config-router)#network 11.0.0.0

Router(config-router)#network 10.0.0.0

Router(config-router)#^Z

Router#

Router#write

After the router configuration check the different PC.As show in figure 7 to figure 10.

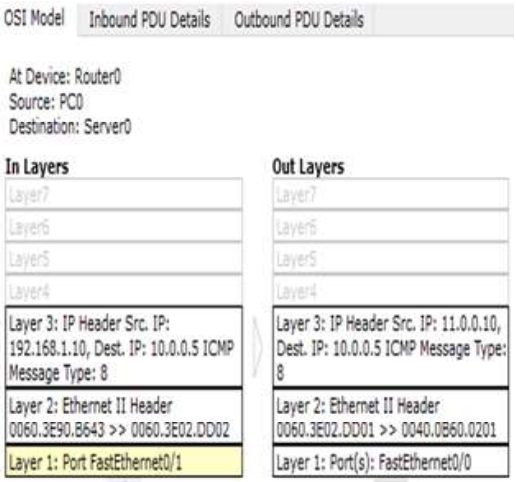

Fig7. PDU Information for PC0 to Router 0

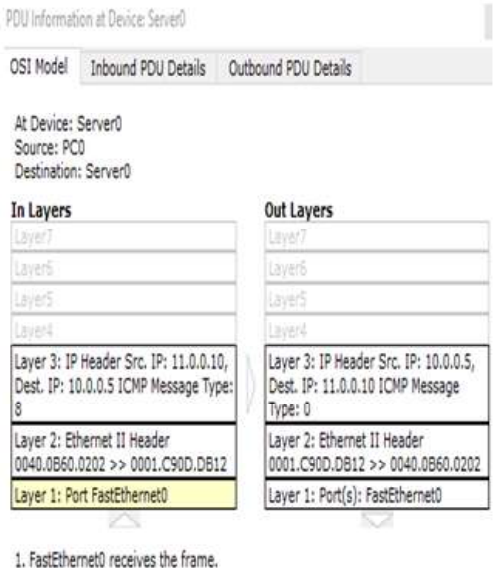

Fig 8.PDU Information for PC0 to Sever0

Fig 9.PDU Information for PC0 to Router 0

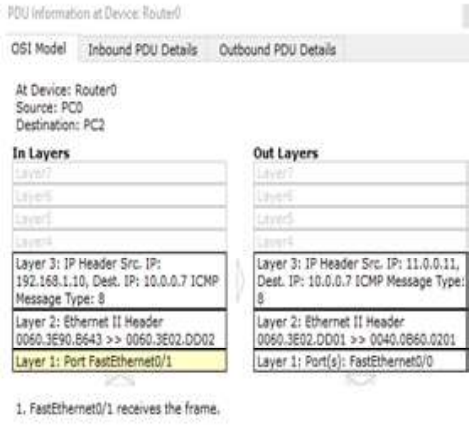

Fig 10.PDU Information for PC0 to PC1

7. CONFIGURATION FOR PAT

If this network uses private IP addresses, the NAT router needs a very large set of registered IP addresses. Dynamic NAT lessens the problem to some degree, because every single host in an internetwork rarely needs to communicate with the Internet at the same time. The NAT Overload

function, also known as Port Address Translation (PAT), translates client outbound traffic to unique port numbers of a single global address.

7.1 Router 0 Configuration

Router>en

Router# conf t

Router(config)#int fa 0/1

Router(config-if)#ip add 192.168.1.1 255.255.255.0

Router(config-if)#no shut

Router(config-if)#exit

Router(config)#int fa 0/0

Router(config-if)#ip add 11.0.0.1 255.0.0.0

Router(config-if)#no shut

Router(config-if)#

Router(config-if)#exit

Router(config)#router rip

Router(config-router)#network 192.168.1.0

Router(config-router)#network 11.0.0.0

Router(config-router)#^Z

Router#

Router(config)#ip nat inside source list 1 pool networking overload

Router(config)#access-list 1 permit 192.168.1.0 0.0.0.255

Router(config)#ip nat pool networking 11.0.0.12 11.0.0.12 netmask 255.0.0.0

Router(config)#int fa 0/1

Router(config-if)#ip nat inside

Router(config-if)#int fa 0/0

Router(config-if)#ip nat outside

Router(config-if)#^Z

Router#

7.2Router 1 Configuration:

Router>en

Router# conf t

Router(config)#int fa 0/0

Router(config-if)#ip add 11.0.0.2 255.0.0.0

Router(config-if)#no shut

Router(config-if)#exit

Router(config)#router rip

Router(config-router)#network 11.0.0.0

Router(config-router)#network 10.0.0.0

Router(config-router)#^Z

Router#

Router#write

After the configuration check the simulation for PDU information. As show in figure 11, figure 12 and figure 13.

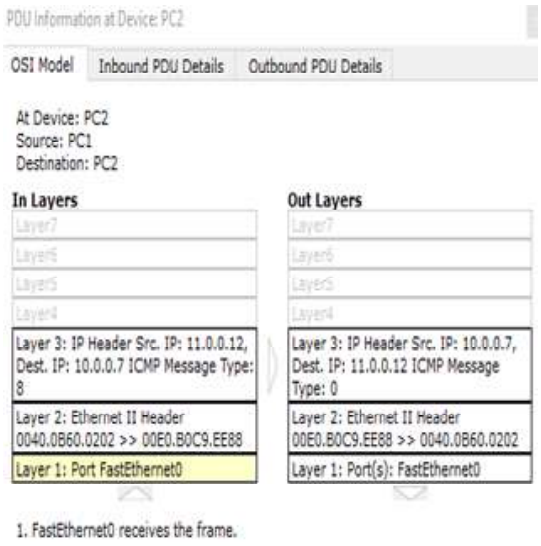

Fig 11. PDU Information for PC1 to PC2

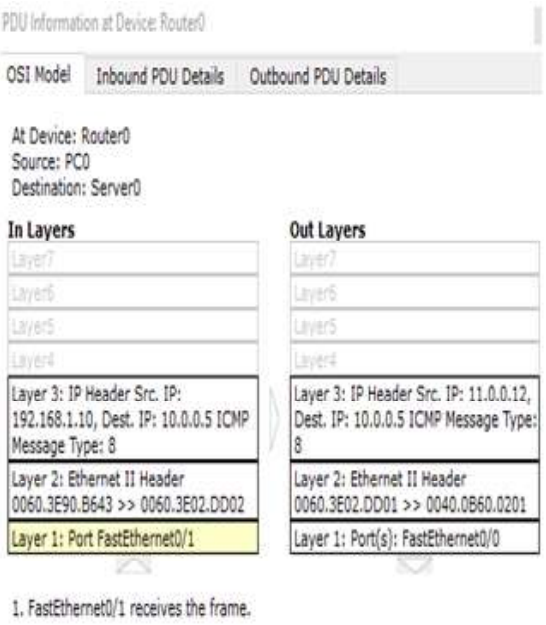

Fig 12. PDU Information for PC0 to Router0

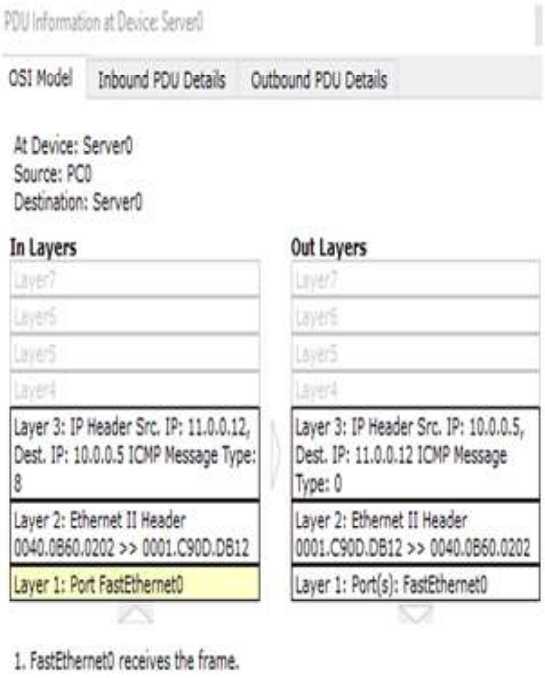

Fig 13.PDU Information for PC0 to Sever0

Table 1. Comparison of Static NAT, Dynamic NAT and PAT

Methods	NAT Router configuration	Inside IP Address	Globally IP address
Static NAT	ip nat inside source static 192.168.1.10 11.0.0.5 ip nat inside source static 192.168.1.11 11.0.0.7	192.168.1.10 (PC0 to PC2)	11.0.0.5
Dynamic NAT	ip nat pool networking 11.0.0.10 11.0.0.50 netmask 255.0.0.0	192.168.1.10 (PC0 to Server0) 192.168.1.10 (PC0 to PC2)	11.0.0.10 11.0.0.11
PAT	ip nat pool networking 11.0.0.12 11.0.0.12 netmask 255.0.0.0	192.168.1.11 (PC1 to PC2) 192.168.1.10 (PC0 to Server0)	11.0.0.12 11.0.0.12

8. CONCLUSION

The routing result has been described above. In this table, if we use static NAT method, we have to configure the using PC's address and IP address in NAT router. If we use the Dynamic NAT method, we have to configure globally IP address rates in NAT router. If we use PAT method, we have to configure one globally IP address in NAT router. So by using NAT method, it can increase the rate of internet. Any network engineer can references this paper for suitable methods of router configuration.

REFERENCES

[1]. Network Address Translation (NAT) - Router Alley. [Online].Available:http:// www.routeralley.com/ra/docs/nat.pdf.

[2]. Introduction to Network Address Translation, [Online].Available:http://www.cisco.com/ networkers/nw00/pres/2211.pdf.

[3]. Jeff Tyson, How Network Address Translation Works http://computer.howstuffworks.com/ nat.htm

[4]. Private Networks and NAT Module. [Online]. Availablehttp://www.cs.virginia.edu/~itlab/book/slides/module17-nat.ppt.

[5]. A.S.Tanenbaum.ComputerNetworks.Prentice-Hall, 2002.

[6]. Introduction to Dynamic Routing Protocols. [Online]. Available:http://ptgmedia.pearsoncmg.com/images/9781587132063/samplechapter/1587132060

Journal of Research and Applications (JRA), UCSMTLA, 2019 Volume-01, Issue-01

Article ID - JRA190067

IMPLEMEMTATION OF PROBLEM SOLVING AGENT USING UNINFORMED SEARCH ALGORITHM

Khaing Zar Myint Aung [(1)], Cherry Oo [(2)]

[(1)(2)]University of Computer Studies (Kalay), Myanmar

[(1)]*kzmyintaung@gmail.com*

ABSTRACT

In Artificial Intelligence, problem-solving agent decides what to do by sequences of actions leading to desirable states. Graphs are the best way to design real-world problems, such as to depict cities linked by roads and to define routes between cities, model air traffic control systems, etc. The researcher can view and study the search algorithms using a graph or state space for problem-solving agent. This paper is intended to develop a problem solving agent using search algorithms. This paper gives a simple implementation of algorithms for uninformed search using graphs. It creates a search graph based on the user. It finds the solution in the created graph using breadth-first search and depth-first search algorithm. This paper allows the beginning of an AI class to learn the Search Algorithms (Blind Search) using only available information in the problem definition..

KEYWORDS: *Artificial Intelligence, Breadth first search algorithm, Depth first search algorithm, Search graph, Implementation*

1. INTRODUCTION

Searching is the universal technique of problem-solving in AI. There are two kinds of AI searching techniques: Uninformed search and Informed search [1]. The problem-solving decides what to do by finding sequences of actions that lead to desirable states [2]. This paper covers several Search strategies that come under the heading of Uninformed Search. The term means that the strategies have no additional information about states beyond that provided in the problem definition. All they can do is generate successors and distinguish a goal state from a non-goal state.

The state-space of the problem is defined by the initial state, goal state, actions and path cost. The path in the state space is a series of states connected with an action sequence. The process of finding out a sequence of actions that reaches the goal is called search [3]. A search algorithm uses an input problem and returns a solution in the form of an action sequence. The branches are actions and the nodes in the space of the problem state. This paper is discussed work by the AI's searching methods. Many AI problems reduce to searching for solutions in the problem state space. The paper focuses more on BFS and DFS by solving a graph as a problem.

2. RELATED WORK

The problem-solving agent decides what to do by finding sequences of actions that lead to desirable states. Search strategy that determines the order in which we search the queue. Search arises in many AI contexts, both as finding a goal and in the more obvious one of finding a path. Search techniques are used in AI to find a sequence of steps that will get us from some initial state to some goal state [4].

Breadth-first search is a more complete and concise uninformed technique that manages to find the best solution using minimal computation but suffers from intensive memory use. The depth-first search explores branches individually before backtracking. It is actually good for long solutions, but only if it is lucky enough to start on a branch with a possible Goal State [5]. Breadth-First Search is good when the branching factor is never too large, and Depth First Search is good when unproductive partial paths are never too long [2].

Data structure plays an important role in computing and graphs are one of the most interesting

data structures in computer science. BFS and DFS are the two most common approaches to graph traversal. Graphs and the trees are somewhat similar to their structure. In fact, the tree is derived from the graph data structure [6].

Searching is a problem-solving technique in artificial intelligence. There are two kinds of AI Searching Technique Uninformed Search and Informed search. There are various search algorithms related to search like Dijkstra, Depth-first search, Breadth-first search, A*, Hill Climbing, Best first search algorithms, and their variants [1].

3. SEARCH STRATEGY

Search in AI is inherent to problem-solving techniques. Fundamentally, artificial intelligence problems are inherently complex [7]. In many AI contexts, a search strategy comes into being both to find a goal and, in the more obvious context, to find a path search technique, a sequence of steps is used in AI to find us from beginning to goal. In two main categories, searches are broken into uninformed searches and informed searches. Uninformed searches are done when the preferred search path is not information available. Informed searching has some knowledge for searching; typically, a thumb rule is used to decrease the search field [4]. Uninformed searches are emphasized in this paper.

3.1 Uninformed search strategies

Uninformed search strategies can be classified as exhaustive or partial and two partial methods are distinguished as breadth-first search and depth-first search methods. The following algorithms are part of uninformed search: Breadth-First Search (BFS), Uniform Cost Search (UCS), Depth First Search (DFS), Depth Limited Search (DLS), Iterative Deepening Search (IDS) and Bidirectional Search (BS) [8]. In this paper, simple implementations of the breadth-first search and depth-first search algorithm are presented in detail using a graph.

3.1.1 Breadth first search (BFS)

Breadth-first search is an uninformed type algorithm, so it does not start will full knowledge of the entire state space [5]. Breadth first search is an algorithm for traversing or searching a graph. The algorithm traverses the graph from the beginning node and explores all the nearby nodes. Then it explores their unexplored neighbor nodes, etc., for each of those nearest nodes, until it reaches its objective. From the algorithm point of view, the First in First out (FIFO) queue includes all child nodes obtained by extending a node [9].

See how an example works for the breadth first search algorithm in the following Figure 1 to 6. We are using a 5 vertices undirected graph.

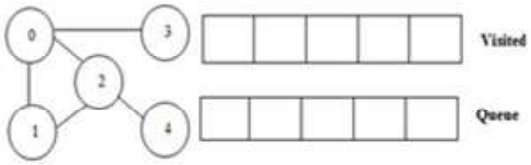

Fig 1. BFS of a graph

Starting from vertex 0, the BFS algorithm begins by placing it in the list of visitors and placing all adjacent vertices in the queue.

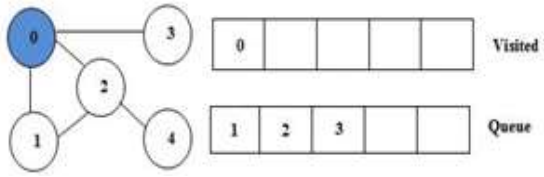

Fig 2. BFS of a graph

Then at the top of the queue we visit the item i.e. 1, go to its adjacent nodes. We visit 2 instead because 0 has been already visited.

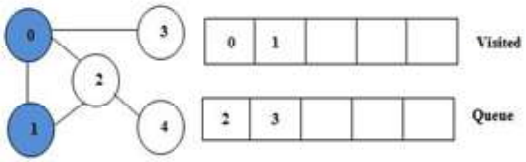

Fig 3. BFS of a graph

Vertex 2 has an adjacent vertex not visited in 4, so we add to the queue top and visit 2.

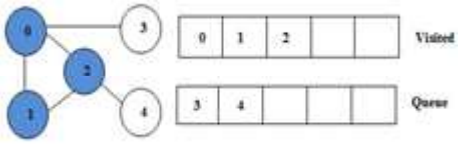

Fig 4. BFS of a graph

Next, at the top of queue we visit element i.e.3

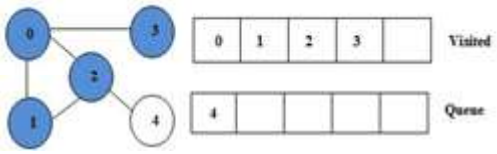

Fig 5. BFS of a graph

Next, the element on the queue top, i.e. 4, is visited.

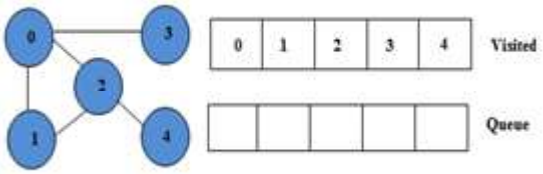

Fig 6. BFS of a graph

After we visit the last element 4, thus the Breadth-First Graph Traversal has been completed.

3.1.2 Depth first search (DFS)

Depth-first search (DFS) is an algorithm for traversing or searching a tree, tree structure, or graph. Intuitively, one starts at the root (selecting some node as the root in the graph case) and explores as far as possible along each branch before backtracking. Formally, DFS is an uninformed search that progresses by expanding the first child node of the search graph that appears and thus going deeper and deeper until a goal node is found, or until it hits a node that has no children. Then the search backtracks, returning to the most recent node it has not finished exploring. All newly expanded nodes are added into the last-in-first-out (LIFO) stack for expansion during a non-recursive implementation [9].

Let's look for an example for the depth-first search algorithm in the following Figure 7 to 12. We are using a 5 vertices undirected graph.

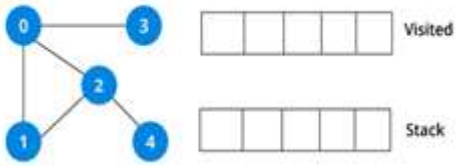

Fig 7. DFS of a graph

The DFS algorithm starts with the vertex 0, and is inserted into the visited list and stacked with the adjacent vertices.

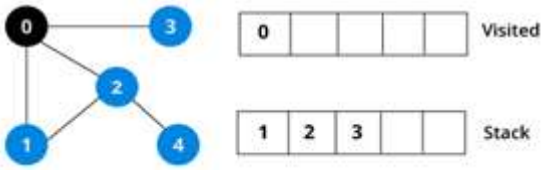

Fig 8. DFS of a graph

Next, we visit the top of the stack, i.e. 1 element and we go to its adjacent nodes and we visit 2 as 0 is already visited.

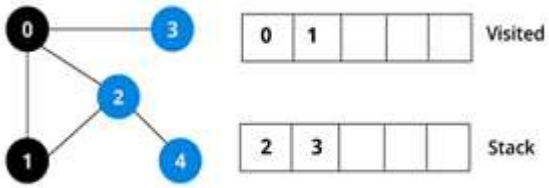

Fig 9. DFS of a graph

Vertex 2 has an adjacent, unattended vertex in 4, so we add it to the stack top and visit it.

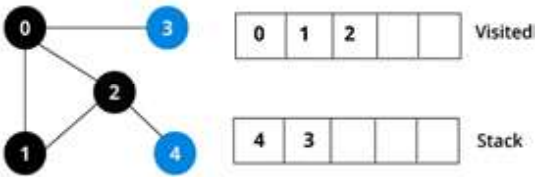

Fig 10. DFS of a graph

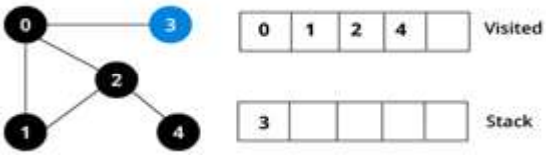

Fig 11. DFS of a graph

Since visiting the last element 3, there are no adjacent nodes not visited, therefore the Depth First Search of the graph has been completed.

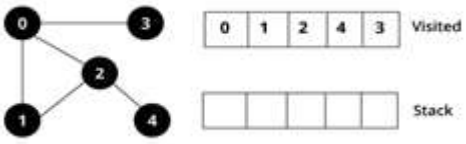

Fig 12. DFS of a graph

3.2 Search graph

A graph G is a triple consisting of a vertex set V (G), an edge set E(G), and a relation that associates with each edge, two vertices called its endpoints. Formally: G = (V, E), where V is a set and E †" V × V. G = (V, E) undirected if for all v, w " V: (v, w) " E Đ!Ò! (w, v) " E. Otherwise it is directed. A simple diagram is a graph that does not have loops or edges. In that case, the endpoints u of each edge e in E (G), v in V (G) may be specified.

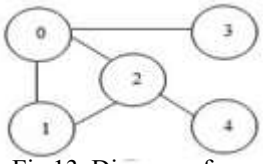

Fig 13. Diagram of a graph

Figure 13 depicts a graph where the set of nodes is {0,1,2,3,4}, and the set of arcs is {(0,1), (0,2), (0,3), (1,2), (2,4)}. This is an example of a directed graph where the pair of the nodes that make up the arcs are ordered.

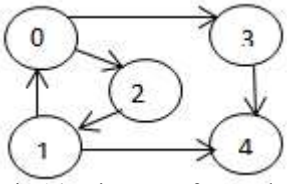

Fig 14. Diagram of a graph

Figure 14 depicts a graph where the set of nodes is {0,1,2,3,4}, and the set of arcs is {(0,2), (0,3), (1,0), (1,4), (2,1), (3,4)}. This is an example of a undirected graph where the pair of the nodes that make up the arcs are ordered.

The development of graphics algorithms is the main role of graph theory in computer applications. Many algorithms are used for the resolution of graphic problem models. These algorithms serve to resolve the graph-theoretical concepts used by interns to solve the corresponding application in computer science.

3.3 Summary of algorithms

The following factors are used to evaluate the performance of the searching algorithms [8]:

A. Completeness: The search algorithm is complete if it guaranteed to find a solution within a finite amount of time and at least one solution exists.

B. Optimality: A search algorithm is optimal if when it finds a solution it is the best solution.

C. Time Complexity: Amount of time required by the algorithm to reach a solution.

D. Space Complexity: Amount of memory required by the algorithm to perform the search.

A summary of the comparison of different search algorithms are observed in table 1. Evaluation of search strategy, b is the branching factor; d is the depth of the shallowest solution. A search algorithm is optimal if when it finds a solution it is the best solution.

Table 1. Summary of algorithms

Criterion	BFS	DFS
Complete?	yes	no
Time complexity	$O(b^d)$	$O(b^m)$
Space complexity	$O(b^d)$	O(bm)
Optimal?	yes	no

4. FLOW OF THE SYSTEM

Figure 14 illustrates the system flow diagram. In this system, the user is allowed to add vertex name in their respective graph. The user can select an adjacent vertex for each vertex. And then the system creates a search graph for a problem. In Uninformed search, the user can enter start point and goal point having in a graph. Then the system will search from start state to goal state in the created search graph using BFS and DFS algorithm. If the goal state is found, the system will display the search sequences from start state to goal state and computation time. If the goal state is not found, the system will display the search sequences, computation time and not found the goal state.

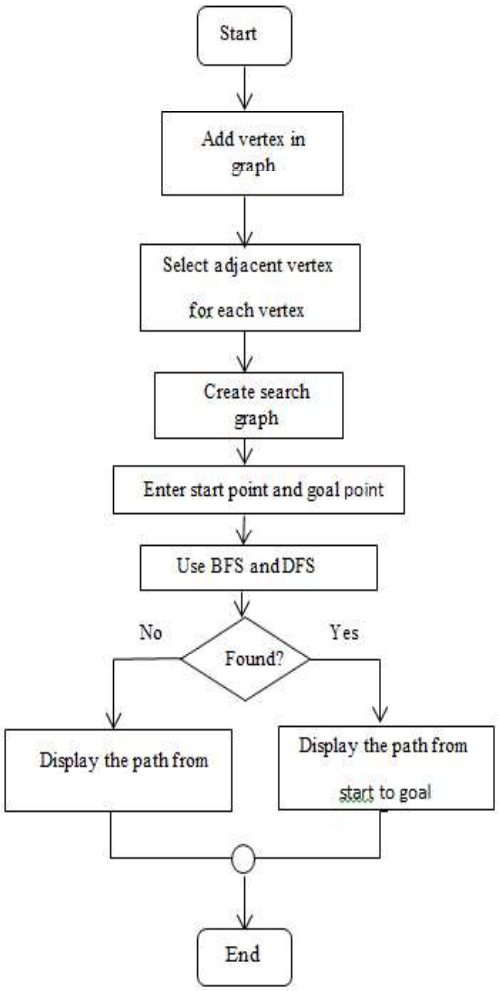

Fig 15. System flow diagram

5. IMPLEMENTATION OF THE SYSTEM

The purpose of this system is to implement a problem-solving agent using a search algorithm. It will be implemented two different strategies: breadth first search, depth-first search. For example, consider graph (Figure 13 and Figure 14). Simple implementation associated with the example is shown in the following Figure 16 to 18. The user enters many nodes how do you want for your graph and the name of the neighbor node for each node. The nodes need to be interconnected to each other to finalize the Graph. Finally, the graph has been created successfully.

Fig 16. Uninformed search using graph

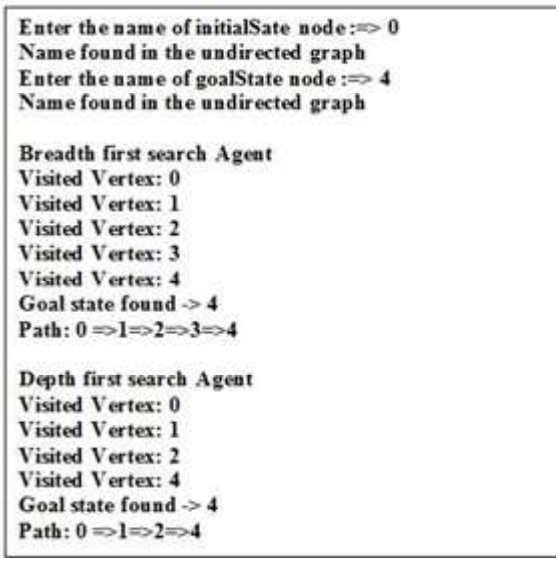

Fig 17. Uninformed search using undirected graph

This system will help you to create a graph and run the solving agents in order to find a solution for the graph given by the user. If the user enters initial state node and goal state node, the calculation will be done until there is a solution for a given problem.

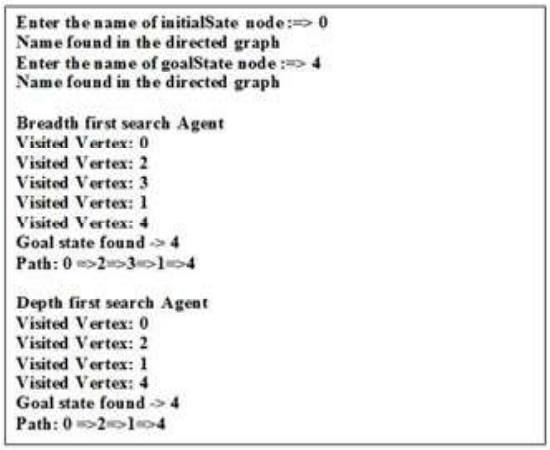

Fig 18. Uninformed search using directed graph

If the user enters an initial state node and goal state node, the implementation will be done until there is a solution from the initial state to the goal state for a given problem. When a solution exists, the program will indicate, for each strategy, all the steps taken, the states that have been visited and the ones that have been considered for examination.

6. EXPERIMENTAL RESULTS

In this section, we analyze on length and searching time for directed graph and undirected graph of the breadth first search and depth first search algorithms.

Table 2. Analysis on directed graph

Algorithm	Length	Calculation Time(Millis)
Breadth First Search	5	3
Depth First Search	4	2

Result analysis comparison of different search algorithms using directed graph are as observed in table 2.

Table 3. Analysis on undirected graph

Algorithm	Length	Calculation Time(Millis)
Breadth First Search	5	3
Depth First Search	4	1

Result analysis comparison of different search algorithms using undirected graph are as observed in table 3.

The above examples, BFS requires 5 nodes to reach the goal state but DFS requires only 4 nodes to reach the goal state. DFS takes minimum time to find the goal state with the optimal path than BFS. For example, in Figure 13, the depth-first search will explore the entire left graph if node 3 is a goal node, then the depth-first search would return it as a solution. Therefore, the depth-first search is not optimal. If the graph were of unbounded depth but contained no solutions, the depth-first search would never terminate, so it is not complete.

7. CONCLUSION

In this system, the user can run one algorithm among two search algorithms. A search algorithm takes a problem as an input and returns a solution in the form of action sequences. Therefore, this system will be able to show how problem-solving can be modeled as the process of searching for a sequence of actions that achieves a goal and introduces some basic algorithms for conducting the necessary search for a sequence of actions. This system is implemented by using Java. The user can get knowledge of search algorithms and solution for a problem by learning this paper. This system can be extended by using other algorithms such as Uniformed Cost Search, A*, Depth Limited Search and so on.

ACKNOWLEDGEMENT

Foremost, I would like to express my advisors Daw Cherry Oo for her support, motivation, enthusiasm and immense knowledge during all the time of doing research and writing this paper.

REFERENCES

[1] S. B. Mansuri, "Comparative Analysis of Path Finding Algorithms," p. 8.

[2] A. M. Nyo and M. M. Win, "Implementation of Breadth First Search and Depth First Search Algorithm." 2008.

[3] K. N. Yin and T. T. Yu, "Searching Methods for Binary Tree." AICT, 2008.

[4] W. E. E. Shwe and M. T. Hnin, "Implementation of Problem Solving Agent using Iterative Deepending Depth-first Search." AICT, 2008.

[5] K. Mathew, M. Tabassum, and M. Ramakrishnan, "Experimental Comparison of Uninformed and Heuristic AI Algorithms for N Puzzle Solution," p. 8.

[6] S. Mukhopadhyay, R. Agarwal, D. Patel, K. Som, and A. Sarkar, "Complexity Based on Traversal of Graphs," *Int. J. Curr. Trends Eng. Res. IJCTER*, vol. 2, pp. 46 – 51, Dec. 2016.

[7] V. Chijindu, "Search In Artificial Intelligence Problem Solving," vol. vol 5, Jan. 2012.

[8] "Comparative Analysis of Various Uninformed Searching Algorithms in AI." [Online]. Available: http://paper.researchbib.com/view/paper/213667. [Accessed: 10-Dec-2019].

[9] A. A., S. Olabiyisi, E. Omidiora, O. Akinwale, M. A., and B. O, "Comparative Study of Complexities of Breadth – First Search and Depth-First Search Algorithms, using Software Complexity Measures," presented at the Lecture Notes in Engineering and Computer Science, 2010, vol. 1.

[10] R. Patel and M. Pathak, "Comparative Analysis of Search Algorithms," 2018.