

An Intelligent Tutoring System for Learning Computer Network CCNA

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Abstract: *Networking is one of the most important areas currently used for data transfer and enterprise management. It also includes the security aspect that enables us to protect our network to prevent hackers from accessing the organization's data. In this paper, we would like to learn what the network is and how it works. And what are the basics of the network since its emergence and know the mechanism of action components.*

After reading this paper - even if you do not have a general background on networking - you will be able to manage your own network and be able to distribute and control your ip.

Keywords: Network; CCNA; Intelligent Tutoring System (ITS); Tutor

1. INTRODUCTION

Intelligent Tutoring Systems (ITS) are, in many respects, very similar to human tutors. Based on cognitive science and Artificial Intelligence (AI), ITS have proven their worth in multiple ways in multiple domains in Education [1, 2].

Currently, ITS can be found in core Mathematics, Physics, and Language courses in many schools various countries world. ITS are growing in acceptance and popularity for reasons including: i) increased student performance, ii) deepened cognitive development, and iii) reduced time for the student to acquire skills and knowledge [1, 2, 3].

Intelligent Tutoring Systems that tutor and monitor Networking have been developed and evaluated for many years in the field of Artificial Intelligence in Education. In many ways, Networking has been a very productive domain in the evolution of most aspects of the field including student modeling, knowledge representation, and the application of sound pedagogical principles. Effective Networking requires a range of problem solving and diagnostic strategies.

The manner in which a student writes code provides rich insight into the reasoning processes of the student.

As a result, networking provides an interesting domain for studying learning and cognitive processes. The goal of this current research is to bring together recent developments in the fields of Intelligent Tutoring Systems, Cognitive Science, and AI to construct an effective intelligent tutor help students learn to Network in CCNA.

In addition to contributing to understanding the learning process in general, it is hoped that this research will have a positive impact on supporting instructors teaching Networking in their institution. More than ever, this is an important area for institutions where there are more students wishing to learn to CCNA, and where it is difficult to provide personalized instruction that they need [4].

Additionally, since there are a growing number of institutions investing in distance learning, this research will play a significant role to provide appropriate methods of teaching this key subject to students learning remotely.

2. ITS SYSTEM ARCHITECTURE

In this research we used a tool to build a intelligent tutoring system to learning Networking in CCNA, in this tool allows the administrator to add lessons, examples and question and many general settings that control the form of the network, this intelligent tutoring system consists of four main components: Domain Unit, Teaching Unit, Student Module and User Interface Module.

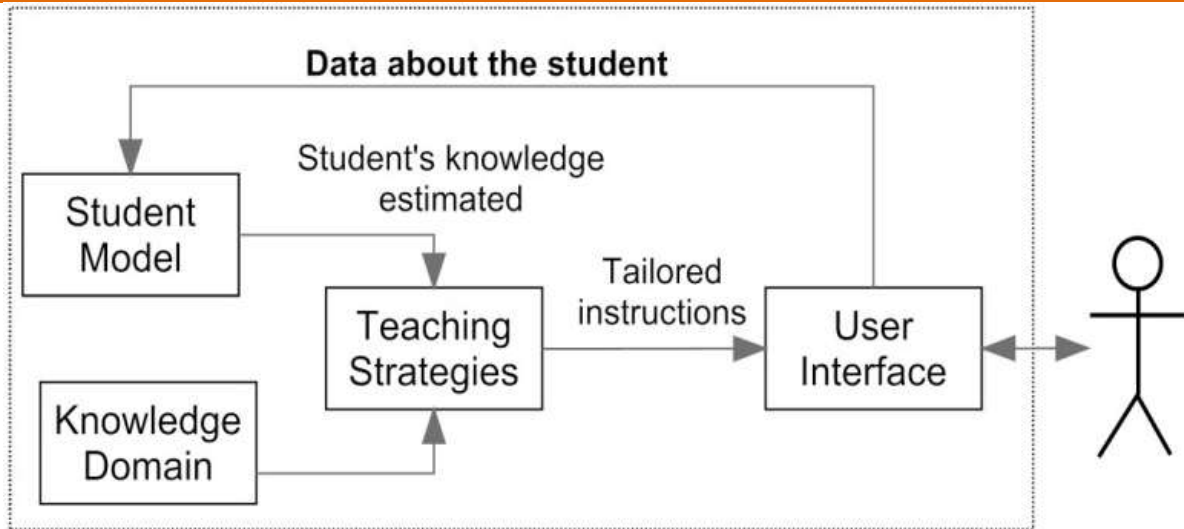


Figure 1: Architecture of an Intelligent Tutoring System.

2.1 KNOWLEDGE DOMAIN MODULE

In this section we will discuss the topics covered by this system:

- **Introduction CCNA:** In the introduction to the topic will be talking about networks in general and what are the topologies used in the network system and a simplified explanation on each subject, explaining the shapes and illustrate the types of networks and explain the OSI model.
- **Internetworking Basics:** explain Address type and network type in details.
- **OSI Reference Model:** explain all Layers and explain each protocol used, establishing a connection-oriented session and transmitting segments with flow control.
- **Ethernet Networking:** This part of the paper covers the latest Layer, detailed expansion of the MAC, how it works, and explanation of Ethernet Cabling. In another part, we talk about Wireless Networking and learn about Data Encapsulation.
- **TCP:** Here, TCP / IP is discussed and each layer is explained with a simple difference with the OSI Model.
- **IP address:** Explain the IP address and explain the types of classes recognized and learn Subnet Masks and Subnetting and identify the benefits and work to establish also and the importance of NAT in the world of networks and also determining IP Address Problems.

2.2 STUDENT MODULE

Each student can use this program through his or her own account, and log on to the system through the student's number to learn the lessons and solve the specific exercises in each lesson. Exercises for students in successive grades will be very easy. If you fail the exercises you will return to the lesson again. Each student will also have a final mark, when learning the lessons and solving the exercises.

2.3 TEACHING MODULE

This module as controller that controls operations in ITS, the student can answer questions if has good degree or more he can move to next level, but if he fails he back to exercises of the same level.

The degree of difficulty increases as the student moves from a lower level to a higher level and if the student obtains a higher degree than good.

2.4 USER INTERFACE

The user interface is divided into two sections for the teacher to add lessons, examples, exercises, modification and deletion, in addition to adding new users to the color adjustment and many settings. The student interface is the one through which lessons are reviewed, exercises are solved and the student's degree is determined. Here some of screenshots of teacher interface and student interface (as shown in figure 2-figure 9).

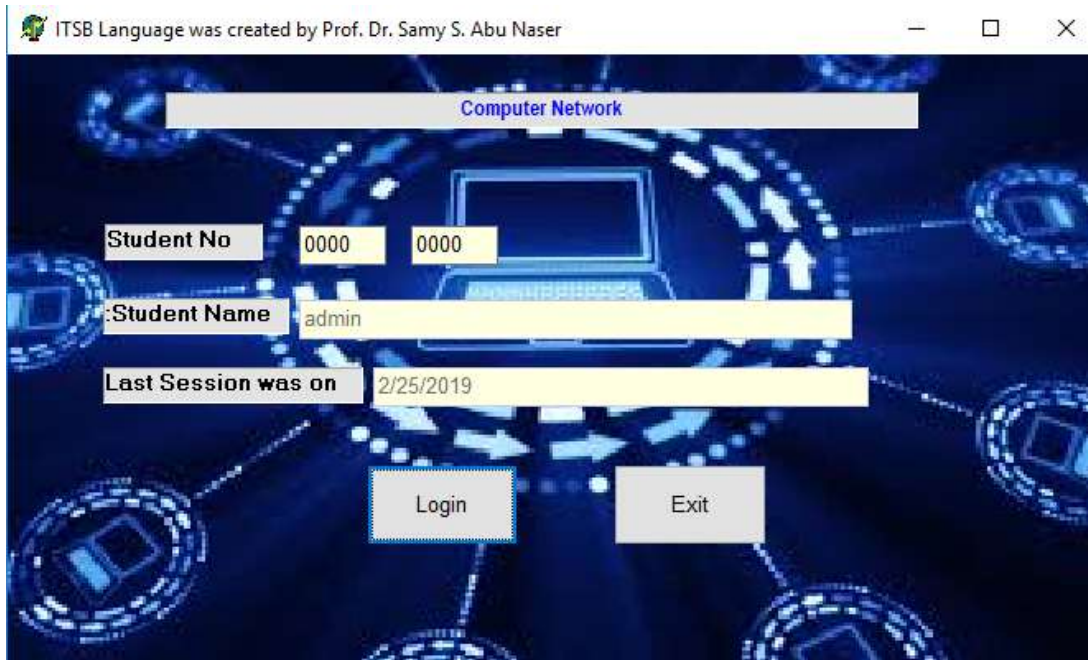


Figure 2: Student Login Form

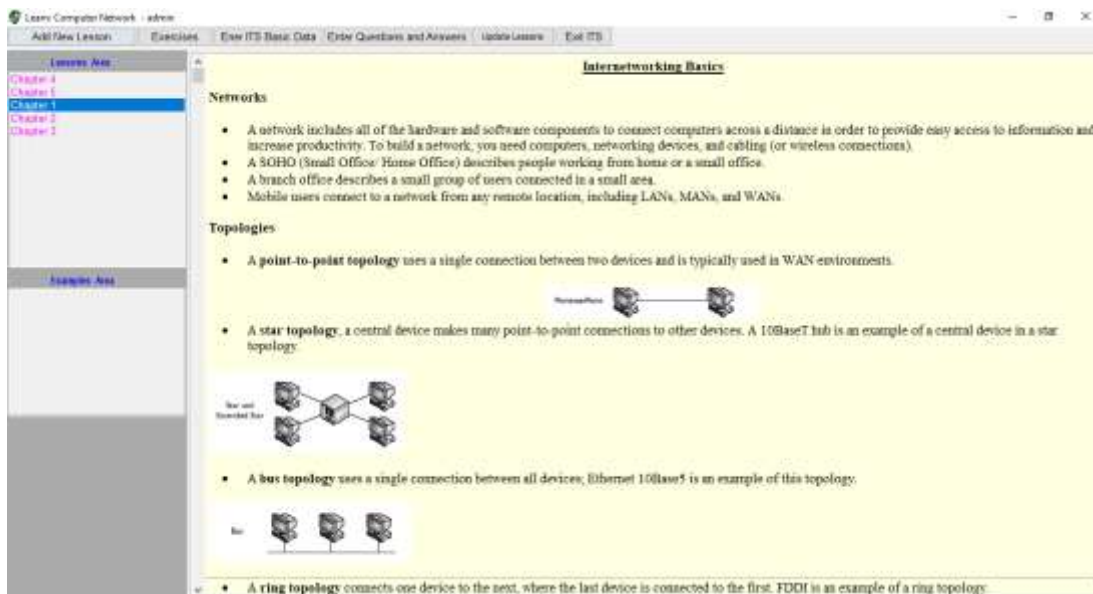


Figure 3: Student lessons and examples form.

Questions and Answers Data Entry

Enter Question Text 1:

Enter Question Text 2:

Enter Answer Choice 1:

Enter Answer Choice 2:

Enter Answer Choice 3:

Enter Answer Choice 4:

Enter Answer Choice 5:

Enter Answer Choice 6:

Enter Pic/Text link(optional)

Enter Vedio link(Optional):

Enter Hint for this question

Enter Correct Answers Choice 1 Choice 2 Choice 3 Choice 4 Choice 5 Choice 6

Level of diffeclty Choose a lesson :

Navigation buttons: <|, <, >, >|, +, -, ^, ✓, ✕, ↻, Close

Figure 4: Interface for modifying Fonts of all screens of the system.

Dr. Samy Abu Naser, Eng. Izzeedin A. Alshawwa

Choose One Lesson

Problem # 2 Difficulty Level # 1

There is a many of topologies in the network

point-to-point topology

star topology

bus topology

all above

Figure 5: Student Exercises form.

The screenshot shows a window titled "Tutor Status" with a light blue background. At the top, there are four input fields: "Session Date" with the value "2/25/2019", "Problem No" with the value "2", "Student Name" with the value "Izzeddin Alshawwa", and "Student No" with the value "44444444". Below these fields is a table with the following columns: studentNo, ProblemNo, difficulty, CurrentScore, OverallScore, SessionDate, and title. The table is currently empty. At the bottom right of the window is a "Close" button.

Figure 6: Student statistics form.

The screenshot shows a window titled "Constants Data Entry" with a light gray background. It has three tabs: "ITS Basic Data", "Students Data", and "Colors". The "ITS Basic Data" tab is active. The form contains several input fields and dropdown menus: "Enter Title of The ITS System (English)" with the value "Computer Network"; "Enter Title of The ITS System (Arabic)" with the value "شيكات الحاسوب"; "Enter Name of creator of the ITS (English)" with the value "Dr. Samy Abu Naser, Eng. Izzedin A. Alshawwa"; "Enter Name of creator of the ITS(Arabic)" with the value "الدكتور سامي أبو ناصر, المهندس عز الدين الشوا"; "Enter name of Background Image" with a file path "C:\Users\Ezz\Desktop\myProject\pictures\network.jpg"; "Enter the meaning of @ symbol", "Enter the meaning of # symbol", "Enter the meaning of \$ symbol", and "Enter the meaning of % symbol", each with a dropdown menu; "Enter the meaning of ^ symbol" with a dropdown menu; and "Enter User Interface Language" with the value "English-انجليزي". At the bottom right are "Save" and "Close" buttons.

Figure 7: Form for adding ITS Basic Data.

The screenshot shows a software window titled "Constants Data Entry" with three tabs: "ITS Basic Data", "Students Data", and "Colors". The "Students Data" tab is active. It contains several input fields with labels and values:

- Enter Student Number: 00000000
- Enter Student Name: admin
- Enter Student Major: (empty)
- Enter Student Grade Point Average: (empty)
- Enter Student Passed Credits: (empty)
- Re-Set Student Difficulty Level: 3
- Re-Set Student Problem No: 1
- Re-Set Student Current Score: 0
- Re-Set Student Over All Score: 0
- Re-Set Student Current Lesson: 227

At the bottom of the window, there is a navigation bar with several icons and a "Close" button.

Figure 8: Form for adding Students Data.

The screenshot shows the "Colors" tab of the "Constants Data Entry" window. It displays a table for configuring the appearance of various UI elements. The table has four columns: "Background Color", "Font Name", "Font Color", and "Font Size".

	Background Color	Font Name	Font Color	Font Size
Forms	clSkyBlue			
Labels		Arial Narrow	clBlue	10
Buttons		Arial	clBlue	10
Page Sheet		Arial	clMaroon	10
Richedit	clInfoBk	Arial	clFuchsia	10
List Box	clBtnFace	Arial	clFuchsia	10
Combo Box	clBtnFace	Arial	clWindowText	10
Edit	clInfoBk	Arial	clBackground	10

At the bottom of the window, there are "Save" and "Close" buttons.

Figure 9: Form for adding questions and answers

3. DIFFICULTIES FACED BY TECHNICIANS

The problem and the reasons that led to the work of this paper through the tutoring system, In the world of networks there are many technicians who have expertise but do not have the foundations and concepts of learning, In the sense that they have no solutions to new problems - non-routine - pass them. Hence the idea and application of the tutoring system in the world of networks is to consolidate the basic concepts of those with this domain.

4. GOAL

As mentioned above, the goal of this paper is to teach the students the concepts and basics in the world of networks through smooth education, test their abilities to learn at different stages and test user comprehension.

5. DEVELOPMENT ON THE SYSTEM

Detailed explanations were made by means of illustrative videos in a scientific way and linked with the scientific bases shown in the paper. It was found that the understanding and comprehension of the user is through teaching and teaching in any field, Let's get out of the subject range a bit and illustrate by gaming, the user will not be proficient at the game of the toughest level when playing for the first time Start with levels gradually to master the game and then be able to overcome the advanced stages This has been applied in the system.

6. CONCLUSION

ITSs are seen as future's mentoring framework and many examinations fulfilled around there. When they are contrasted with customary classroom climate, ITSs are very effective and moderately having instructors' spot, they go up against supporting obligation for understudies. In customary showing condition, understudies' contrasts aren't considered. In this paper, we have designed intelligent tutoring system for student learning Java. The system was created for students who need to think about Java or increment their knowledge in this field easily. The evaluations of the system have been done by teachers and students.

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