Problem Solving

Problem Solving Skills

Solving problems is the core of computer science. Programmers must first understand how a human solves a problem, and then understand how to translate this *algorithm* into something a computer can do. To solve problems, programmers need to know how to *write* the specific computer syntax to get the job done.

Problem-solving strategies are the steps that one would use to find the problem(s) that are in the way to getting to one's own goal.

PROBLEM SOLVING SKILLS
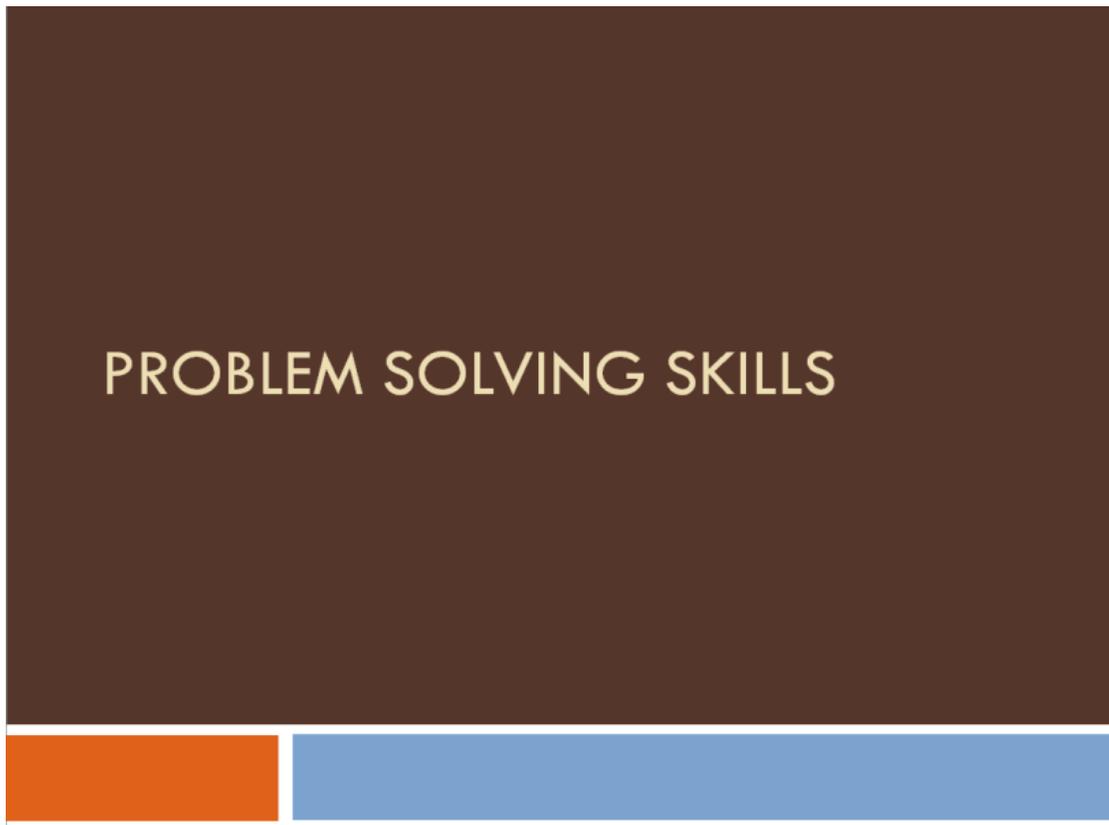
Click on the picture to read the presentation

Computers are used in many disciplines to accomplish tasks. Doctors use computers to diagnose diseases, while construction workers use computer software to create floor plans.   Computers are used by fast food restaurants to compute menu items as well as maintain inventory. The use of computers in many industries aids in solving problems

and assists in the maintenance of employee records. Solving problems requires that you recognize the problem, define the problem, establish, select, and test possible solutions, determine factors to evaluate solutions and ultimately carry out the solution based on the best option. An algorithm can also be created to assist in solving problems. Algorithms are a set of steps for carrying out a task.

Assignment: Problem Solving Assignment

Directions: You have been hired as a computer lab assistant at Dingdong High School. Your job description requires that you assist the computer lab technician in troubleshooting computer problems, maintaining the computer labs, and installing software. The computer lab technician called in sick and you are the main contact for the school for the next week. The head football coach contacts you and shares that he recently purchased software that helps athletes keep track of their eating habits as well as track their sporting stats. The software has not been approved by the Board of Education (BOE), however; the coach indicates that the computer lab technician has installed software for him in the past without the approval of the BOE.

Using the problem solving process steps, create a report using a word processing document or presentation software to detail the seven step problem solving steps you would take to resolve the problem. Your solution should be typed directly into the itsLearning textbox. Do not attach a separate document and be sure you proofread.

Algorithms

An algorithm is a set of steps for carrying out a task. The recipe noted here is an example of an algorithm. The instructions for the recipe are detailed and if followed correctly, guarantee that you can accomplish the task of making LeeAnn's Salsa. Algorithms for can be written for any number of day to day tasks. For example, you can use an algorithm to knit a sweater, complete your income taxes, or even make friends.
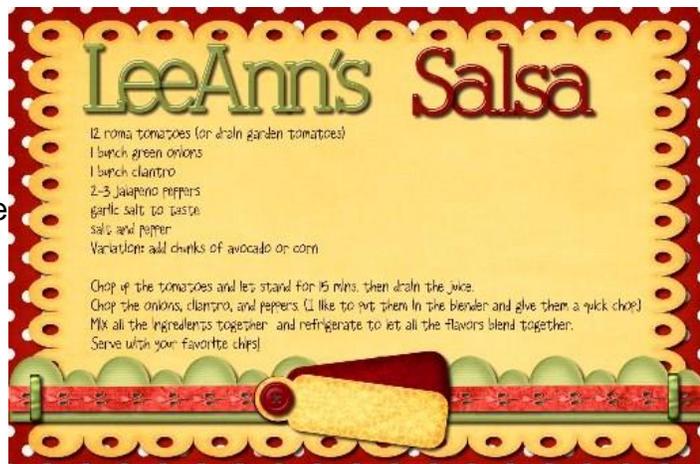

Algorithm for Making Friends

Algorithms are usually written in a format that is not specific to a particular programming language.   As a result, you can focus on formulating a correct algorithm and not be

concerned with the syntax of a computer programming language. Algorithms can be written in the following formats:

- Pseudocode - A mixture of English and a programming language.
- Structured English - Subset of the English language with a limited selection of sentence structures that reflect processing activities.
- Flow Chart - A graphical representation of the way a computer should progress from one instruction to the next.

Algorithms are essential to the way computers process information. Many computer programs contain algorithms that specify the specific instructions a computer should perform (in a specific order) to carry out a specified task.
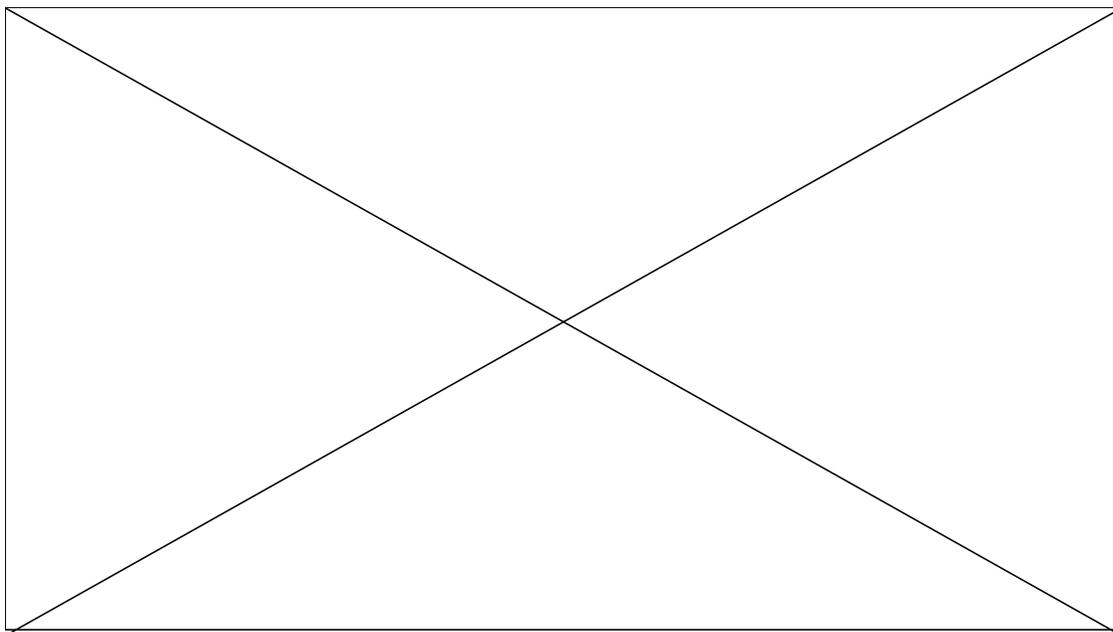
Assignment: Question for Thought 1

Directions: There are times when an algorithm cannot be written to solve a problem. Share an example of a situation that cannot be solved with the use of an algorithm and explain why it cannot be solved with an algorithm. Your essay should be about 150 words and typed directly into the itsLearning textbox. Do not attach a separate document and be sure you proofread.

Assignment: Computers Used in Other Disclipines Current Event

Directions: Download the assignment from itsLearning.

Meet Watson

Computers have been used for decades to solve problems and to make life easier for people. However, computers are only as effective and the output only as good as the input provided and the process coded but in the near future, that all might just be changing. Meet Watson. After completing against the two greatest Jeopardy! champions of all time, the technology behind Watson will now be applied to some of the world's most enticing challenges.

After Watson's groundbreaking performance on Jeopardy!, see how this incredible smart technology processes data. In This video, the four steps of Watson's question answering technology are covered, along with the future holds for IBM's intelligent natural language processing platform beyond Jeopardy!

IBM Watson is defining a new era of cognitive technology. This generation of problem solvers is going to learn much faster with IBM Watson. And Watson, in turn, will learn how faster with us. Developers will solve new problems. Business leaders will ask bigger questions. And together, we'll do things generations before could not dream of.

Flow Charts

Flowcharts are visual representations of a process. A flowchart graphically represents the sequence of operations or step-by-step progression of a programming or problem solving, using connecting lines and conventional symbols. Flowcharts use simple geometric symbols and arrows to define relationships. In programming, for instance, the beginning or end of a program is represented by an oval. A process is represented by a rectangle, a decision is represented by a diamond and an I/O process is represented by a parallelogram. The Internet is represented by a cloud. Flowcharts are used in analyzing, designing, documenting or managing a process or program in various fields.

Here is an example. We have a desk lamp that does not work. What do you do to trouble-shoot the lamp not working?

You might ask yourself is the lamp plugged in? If no, then plug in the lamp. If yes, is the bulb burned out? If yes, replace the bulb. If no, then buy a new lamp. You could also ask questions like, does the outlet work? Are there frays in the electrical cord? I think you get the idea.

Take a look at the process of for dealing with a non-functioning lamp.
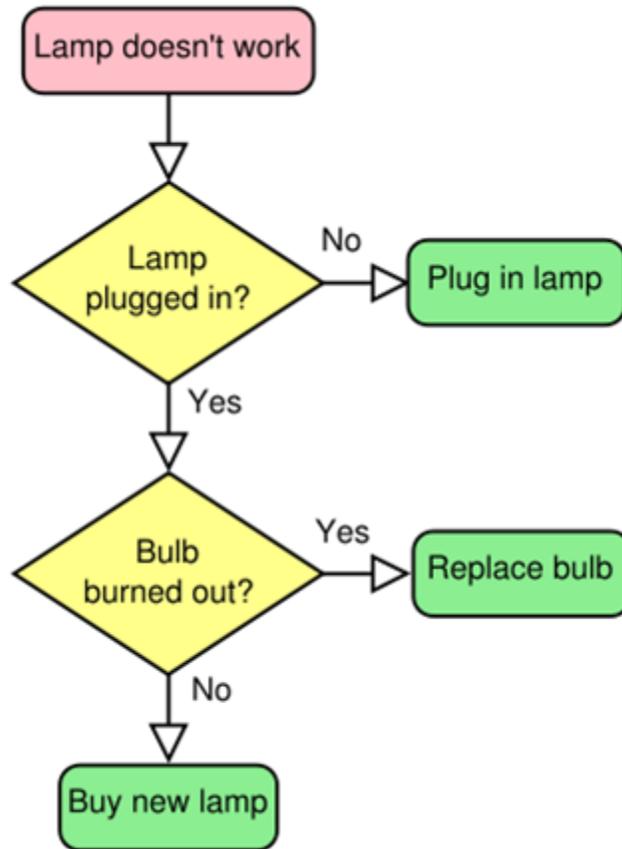
Flowcharts can be drawn by hand or using software. Microsoft Word has flowcharting symbols in its symbol library. Software such as creately can help you make professional looking flowcharts. Symbols are used in flowchart to present processes, decisions, and documents as well as the start and end of the problem.
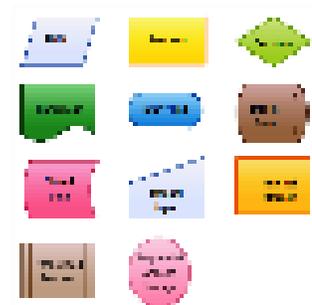
Looking at our Lamp flowchart, we see that "Lamp doesn't work" and "Buy new lamp" are *Start/End*. "Lamp plugged in?" and "Bulb burned out?" are *decisions*. What do you think "Plug in lamp" and "Replace bulb" are? (answer: end). For more information about the flow chart symbols visit Flowchart Symbols and Their Usage.

Assignment: Mail Algorithm Project

Directions: Create an algorithm flowchart for obtaining the mail from your home mailbox. You must use flowchart symbols in your flowchart.

Computers Solving the Problems

Machine language: how Siri found its voice. Inside the art of making computers talk

Today's talking phones and cars are almost human sounding. That's because they are human. Or at least, they once were. The text-to-speech industry is extremely competitive, and highly secretive. Getting a computer to assemble a human-sounding voice is a Herculean task. Technology companies have been trying to make computers speak "naturally" since before the PC was first introduced. Now, with more advanced software and an elaborately crafted process, companies are getting closer to making computer-human interaction seamless. In this feature, The Verge takes a look at how Nuance Communications, the company behind Siri, programs its latest Dragon Reader software.

Software Solutions

Think about some of the software that we use every day that helps make our lives easier. Here are a few examples of software that affects are personal and professional lives:

Microsoft Excel is a spreadsheet application developed by Microsoft for Microsoft Windows and Mac OS. It features calculation, graphing tools, pivot tables, and a macro programming language called Visual Basic for Applications. With Excel, we can easily create mortgage calculators and budgets, just to name a few. Excel has become a staple for problem solving in the business world.

Microsoft Access, also known as Microsoft Office Access, is a database management system from Microsoft that combines the relational Microsoft Jet Database Engine with a graphical user interface and software-development tools. With Access, we can create a database of customers to use in our business. We can easily track inventory and generate reports.

Hardware Incompatibilities

Hardware incompatibilities are a fact of life. In today's computer industry, hundreds of manufacturers develop hardware and software. Software developed for the Windows operating system may not be compatible with the Macintosh operating system or the Linux operating system. Each developer has a unique perspective on the best way to accomplish the same task, and each will provide a unique solution. Copyright and patent issues further complicate the matter. The most common incompatibilities occur between hardware and software. Changing or upgrading a computer or network operating system can lead to major problems. As a first step before you install software to your computer, make sure

that you exceed the minimum requirements for the resources in the computer. These resources include processor speed, memory, and disk space.

TurboTax is an American tax preparation software package developed by Michael A. Chipman of Chipsoft. TurboTax is one of the most popular income tax preparation software packages in the United States and millions of people use Turbo Tax every year to prepare personal and small business income tax.

Assignment: Question for Thought 2

Directions: How can computers be used to solve problems? Think of at least 5 different ways that computers are used to make our lives easier. Describe how our lives are made easier by computers. Your easy should be about 150 words and typed directly the itsLearning textbox. Do not attach a separate document and be sure to proofread.

Resources

If you are having problems viewing this page, opening videos, or accessing the URLs, the direct links are posted below. All assignments are submitted in itsLearning. If you have having problems, contact Mrs. Rush through the itsLearning email client.

Problem Solving Skills presentation: http://www.mrsrush.net/idt/probsolve/psskills.pdf

Algorithm for Making Friends: http://www.youtube.com/watch?v=k0xgjUhEG3U#t=20

Siemens video: http://bcove.me/mu7x4j5j

IBM Watson: Final Jeopardy video: http://www.youtube.com/watch?v=ll-M7O_bRNg

IBM Watson: The Science Behind an Answer video: http://www.youtube.com/watch?v=DywO4zksfXw

What Will You Do with Watson video: http://www.youtube.com/watch?v=Y_cqBP08yuA

Flowchart Symbols article: http://creately.com/diagram-type/objects/flowchart

Feature Machine Language video: http://player.ooyala.com

Transcript: http://mrsrush.net/communicatons/index.pdf

Credits

Man drawing a flowchart photo: Microsoft Word

LeeAnn's Salsa recipe card: http://pinkpolkadotcreations.com/2014/03/13/recipe-cards/

Transcript of this lesson