

Thinking and Being FIT



Being Fluent With Information Technology requires life long learning. Though FIT100 is only the starting point, we have been exposed to many topics.

But, first, let's think.

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Can A Computer Think?

“Asking if a computer can think is like asking if a submarine can swim”

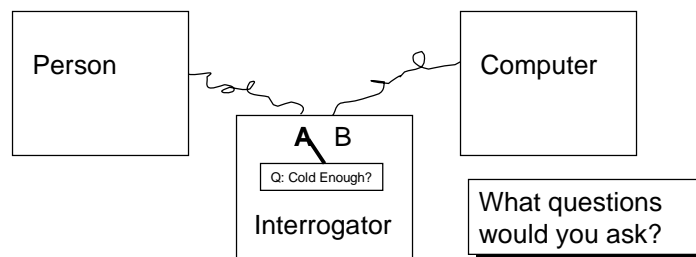
- ❖ Intelligence could be defined as a property of people
- ❖ But computers can do interesting things that people do that seem to take intelligence:
 - ❑ Balance a check book and approximate pi
 - ❑ Check for spelling errors
 - ❑ Type-set documents aesthetically
 - ❑ Make medical diagnoses
 - ❑ Recognize spoken English over the phone
 - ❑ Play and win at games
 - ❑ ...

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Turing Test

- ❖ In 1950 A.M. Turing proposed a way for answering the question of whether computers are intelligent
- ❖ Strategy: If a person cannot determine through a dialog with a computer and a person which one is the person, then the computer must have some level of intelligence



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Revealing Questions

- ❖ Are you a person?
- ❖ What day is it?
- ❖ Who was the first president of the US?
- ❖ What is 44109338777327?
- ❖ Can white win in 1 move from this chess position ...?
- ❖ How does Hamlet's most famous soliloquy start?
- ❖ What's odd about "We all scream for ice cream"?
- ❖ What was your father like?
- ❖ What is your opinion about impeaching someone for private, personal behavior?

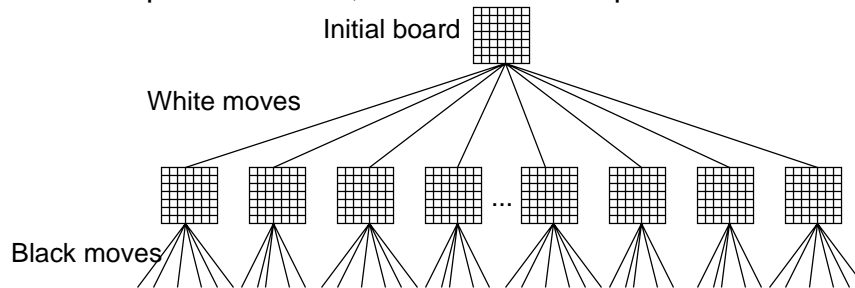
Which of these might a computer answer?

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The Challenge of Chess

- ❖ Chess is a deterministic game in the sense that it does not involve randomization, such as dice
- ❖ There are a finite number of chess positions, that is, legal arrangements of chess pieces on a board
- ❖ Computers are fast, so enumerate all positions ...



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A Computer Can Solve Chess, Not

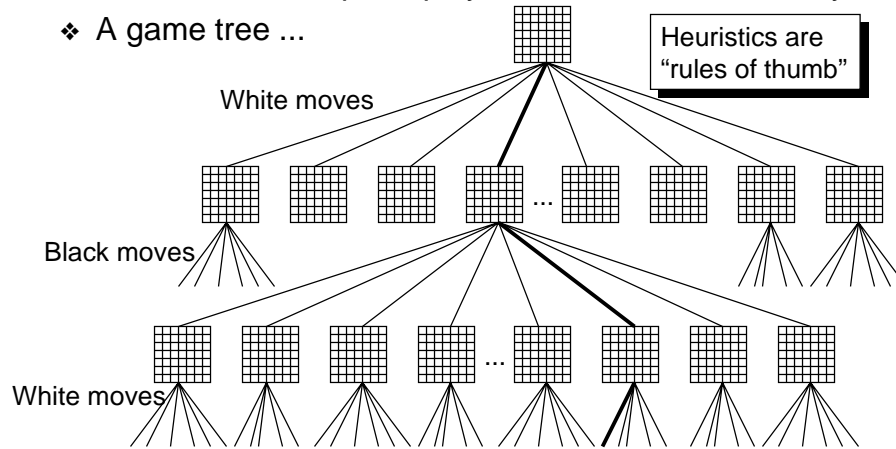
- ❖ Exhaustive searching of the chess game tree is impractical
 - ❑ 20 possible initial moves
 - ❑ On average there are about 35 moves possible from a given position
 - ❑ Typical games are about 100 moves long
- ❖ Estimate 35^{100} boards in the tree ... there are fewer protons in the entire universe
 - For a computer to play good chess it needs smarts!
- ❖ In the 1960s the pioneers of artificial intelligence -- researchers who study making computers “intelligent” thought that “the day is near when a computer will be the reigning world chess champion”

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Game Trees

- ❖ How could a computer play chess, if not exhaustively
- ❖ A game tree ...



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The Day Came

- ❖ Deep Blue, IBM's chess playing supercomputer was the first computer to win a tournament against the world champion, Gary Kasparov
- ❖ Kasparov resigned (in a huff) after 19 moves into the sixth and final game of the match (losing 2.5 to 3.5)

"I tried to play through the rest of the game as best I could, but I lost because [Deep Blue] played great. It played like God."

Did Deep Blue Exhibit Intelligence?

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The 10 Most Important Topics ...

- Topics
- Networks ...
 - Digitarati ...
 - Computers ...
 - Algorithms ...
 - Programming ...
 - Logical Reasoning ...
 - Abstracting
 - Databases ...
 - Deep Ideas ...
 - Self-reliance ...

- Exposure to Skills ...
- Pine
 - Netscape and IE
 - FTP
 - Word
 - Excel
 - Access
 - Search engines
 - VB6.0

Networks

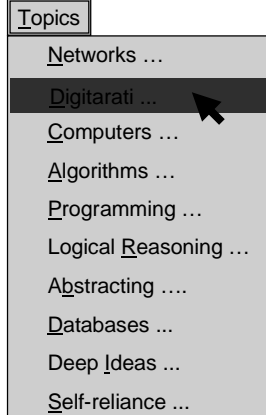
- ❖ Internet, Local Area Network
- ❖ TCP/IP and postcard analogy
- ❖ Ethernet and conversation analogy
- ❖ IP Address, DNS
- ❖ Hierarchical domain names
- ❖ **spiff.cs.washington.edu**
- ❖ World Wide Web
- ❖ HTML, FTP, http://
- ❖ Physical/logical separation

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What the Digtarati Know

- ❖ A human's innate knowledge of technology
- ❖ The perfect GUI: Mac CD Player
- ❖ Consistent interfaces
- ❖ Standard metaphors
- ❖ Standard information processing operations
- ❖ Clicking Around
- ❖ Blazing Away
- ❖ Notice how extensively you used this skills with DBs



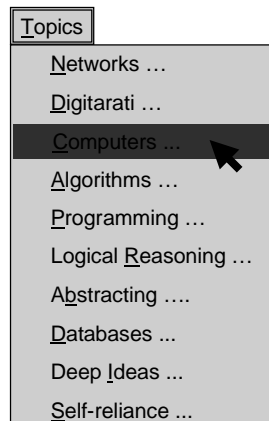
Go boldly where you have never gone before

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Computer Basics

- ❖ Fetch/Execute cycle and analogy to Nenana Ice Classic
- ❖ Five components of a computer
- ❖ Memory and container analogy
- ❖ Machine instructions and the indirect reference to operands
- ❖ Instruction reference via PC
- ❖ Memory and speed terminology



Knowing how computers work it should be obvious why they are always so exacting

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Algorithmic Thinking

- ❖ Five basic properties of algorithms
 - ❑ Input Specified ... like procedure formal
 - ❑ Output Specified ... like procedure results
 - ❑ Effectiveness
 - ❑ Definiteness } Assured by language
 - ❑ Finiteness ... iterations stop
- ❖ Alphabetize CD's example
- ❖ Importance of language in being precise
- ❖ Difference between algorithms and programs

Topics

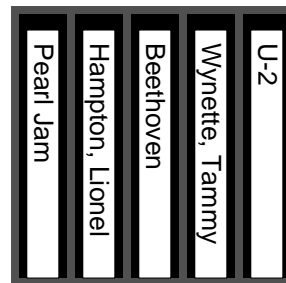
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Alphabetize CDs

```
Private Sub AlphabetizeCD (slots() As String, n As Integer)
  Dim alpha As Integer, bet As Integer
  Dim temp As String
  alpha = 0
  bet = 1
  Do While alpha < n - 1
    Do While bet < n
      If slots(alpha) > slots(bet) Then
        temp = slots(alpha)
        slots(alpha) = slots(bet)
        slots(bet) = temp
      End If
      bet = bet + 1
    Loop
    alpha = alpha + 1
    bet = alpha + 1
  Loop
End Sub
```



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Programming

- ❖ Names, values and variables
- ❖ Assignment
- ❖ Expressions
- ❖ Conditionals
- ❖ Procedures with parameters
- ❖ Iteration
- ❖ Indexing
- ❖ VB6 Integrated Development Env

These are a sufficient set of concepts to solve any problem by computer, though there is much more to learn about programming

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Reasoning Exercises

- ❖ Worked through as series of problem solving and reasoning situations
 - ❑ Binary search algorithm
 - ❑ CDC database design
 - ❑ Weight Guesser program
 - ❑ Inch Worm program
 - ❑ Art Work program
 - ❑ Body Mass Index program
- ❖ Programming exercises
 - ❑ Zodiac problems
 - ❑ Graphic art program

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Abstraction

- ❖ On several occasions abstraction was discussed
 - ❑ Procedural abstraction
 - ❑ Algorithms as more abstract programs
 - ❑ Debugging and trouble shooting
 - ❑ Testing solutions
- ❖ Think abstractly about processes
 - ❑ How do things work
 - ❑ Am I being as effective with computers as possible
 - ❑ Can I apply more or better technology

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Databases

- ❖ Basic structure of relational DBs, including tables, tuples, fields, types
- ❖ Forming relationships in DBs
- ❖ Queries
- ❖ Basics of Access
 - ❑ Tables, Forms, Reports
 - ❑ Wizards
 - ❑ Editing and revising the system

Build a database for your own needs ... catalog your books or CDs, address book, help out your club or organization with record keeping

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Deep Ideas In Human Thought

- ❖ Can computers think
- ❖ Who owns your information
- ❖ Interpretation of instructions
- ❖ Digital representation of information
- ❖ Using the intractability of factoring as a means of privacy of information
- ❖ Algorithmic thinking and the encapsulation of processes

These issues have not been resolved by or anyone, but key aspects of the ideas have been introduced

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You're On Your Own

- ❖ How to find information
- ❖ Finding work-arounds to bugs or system incompatibilities
- ❖ "Going out and coming back in"
- ❖ Extensive experience with contemporary systems
- ❖ Reasoning by analogy and example

FIT100's goal is to initiate you on a life-long learning process, wherein you determine when you need to learn more about IT and then to do so on your own!

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