

MY FAVORITE XKCD COMICS

ROMANCE, SARCASM, MATH, AND LANGUAGE

Author/Artist: Randall Munroe

Background: degree in physics

What: xkcd, a webcomic, no meaning to the name "X" "K" "C" "D"

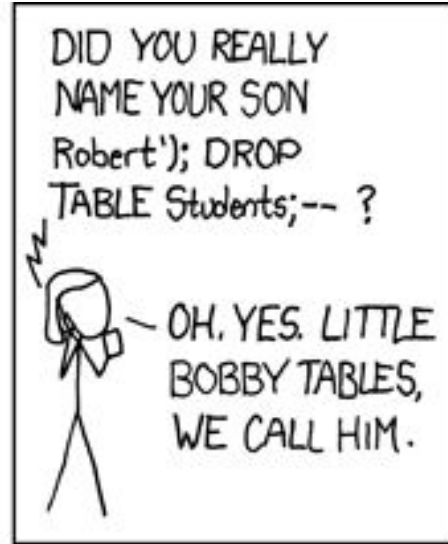
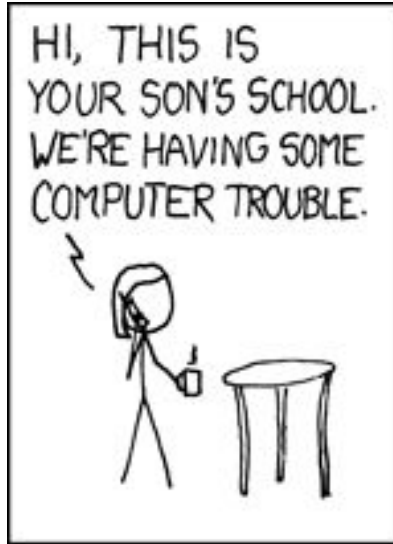
TOPICS

There are many topics Mr. Munroe discusses:

- Math!
- Astronomy
- Physics
- The Internet
- Graphs!
- Social norms
- **Computer Science! ******
- Many others

A SUBSET OF MY FAVORITES, IN NO ORDER

1: Exploits of a Mom



MO: Her daughter is named Help I'm trapped in a driver's license factory.

THIS IS GIT. IT TRACKS COLLABORATIVE WORK
ON PROJECTS THROUGH A BEAUTIFUL
DISTRIBUTED GRAPH THEORY TREE MODEL.

COOL. HOW DO WE USE IT?

NO IDEA. JUST MEMORIZE THESE SHELL
COMMANDS AND TYPE THEM TO SYNC UP.
IF YOU GET ERRORS, SAVE YOUR WORK
ELSEWHERE, DELETE THE PROJECT,
AND DOWNLOAD A FRESH COPY.



Git - this is so appropriate!

MACHINE LEARNING



AI

Speaking of ML....

TO COMPLETE YOUR REGISTRATION, PLEASE TELL US
WHETHER OR NOT THIS IMAGE CONTAINS A STOP SIGN:



NO

YES

ANSWER QUICKLY—OUR SELF-DRIVING
CAR IS ALMOST AT THE INTERSECTION.

SO MUCH OF "AI" IS JUST FIGURING OUT WAYS
TO OFFLOAD WORK ONTO RANDOM STRANGERS.

AND SPEAKING OF CROWDSOURCING...



NOBODY CAUGHT ON THAT OUR BUSINESS
PLAN DIDN'T INVOLVE US IN ANY WAY—
IT WAS JUST A DESCRIPTION OF OTHER
PEOPLE MAKING AND SELLING PRODUCTS.

CLASSIFICATION VS. LOOKUP

5 years??



IN CS, IT CAN BE HARD TO EXPLAIN
THE DIFFERENCE BETWEEN THE EASY
AND THE VIRTUALLY IMPOSSIBLE.

YOU KNOW THIS METAL
RECTANGLE FULL OF
LITTLE LIGHTS?

YEAH.



I SPEND MOST OF MY LIFE
PRESSING BUTTONS TO MAKE
THE PATTERN OF LIGHTS
CHANGE HOWEVER I WANT.

SOUNDS
GOOD.



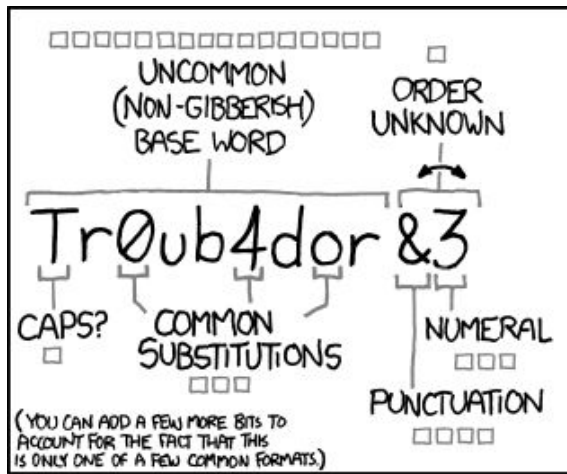
BUT TODAY, THE PATTERN
OF LIGHTS IS *ALL WRONG!*

OH GOD! TRY
PRESSING MORE
BUTTONS!

IT'S NOT
HELPING!



PASSWORDS



~28 BITS OF ENTROPY

$2^{28} = 3 \text{ DAYS AT } 1000 \text{ GUESSES/SEC}$

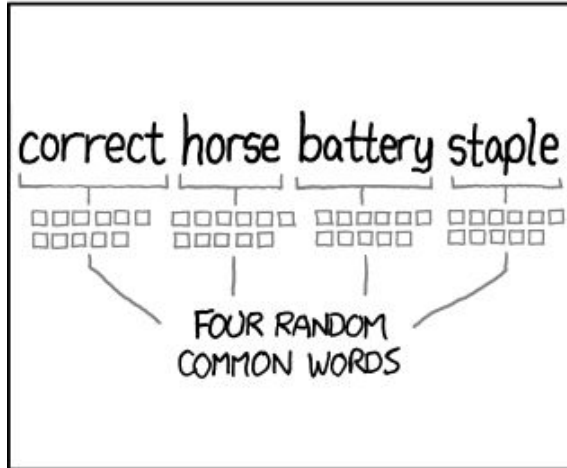
(PLAUSIBLE ATTACK ON A WEAK REMOTE WEB SERVICE. YES, CRACKING A STOLEN HASH IS FASTER, BUT IT'S NOT WHAT THE AVERAGE USER SHOULD WORRY ABOUT.)

DIFFICULTY TO GUESS: EASY

WAS IT TROMBONE? NO, TROUBADOR. AND ONE OF THE 0s WAS A ZERO?

AND THERE WAS SOME SYMBOL...

DIFFICULTY TO REMEMBER: HARD



~44 BITS OF ENTROPY

$2^{44} = 550 \text{ YEARS AT } 1000 \text{ GUESSES/SEC}$

DIFFICULTY TO GUESS: HARD

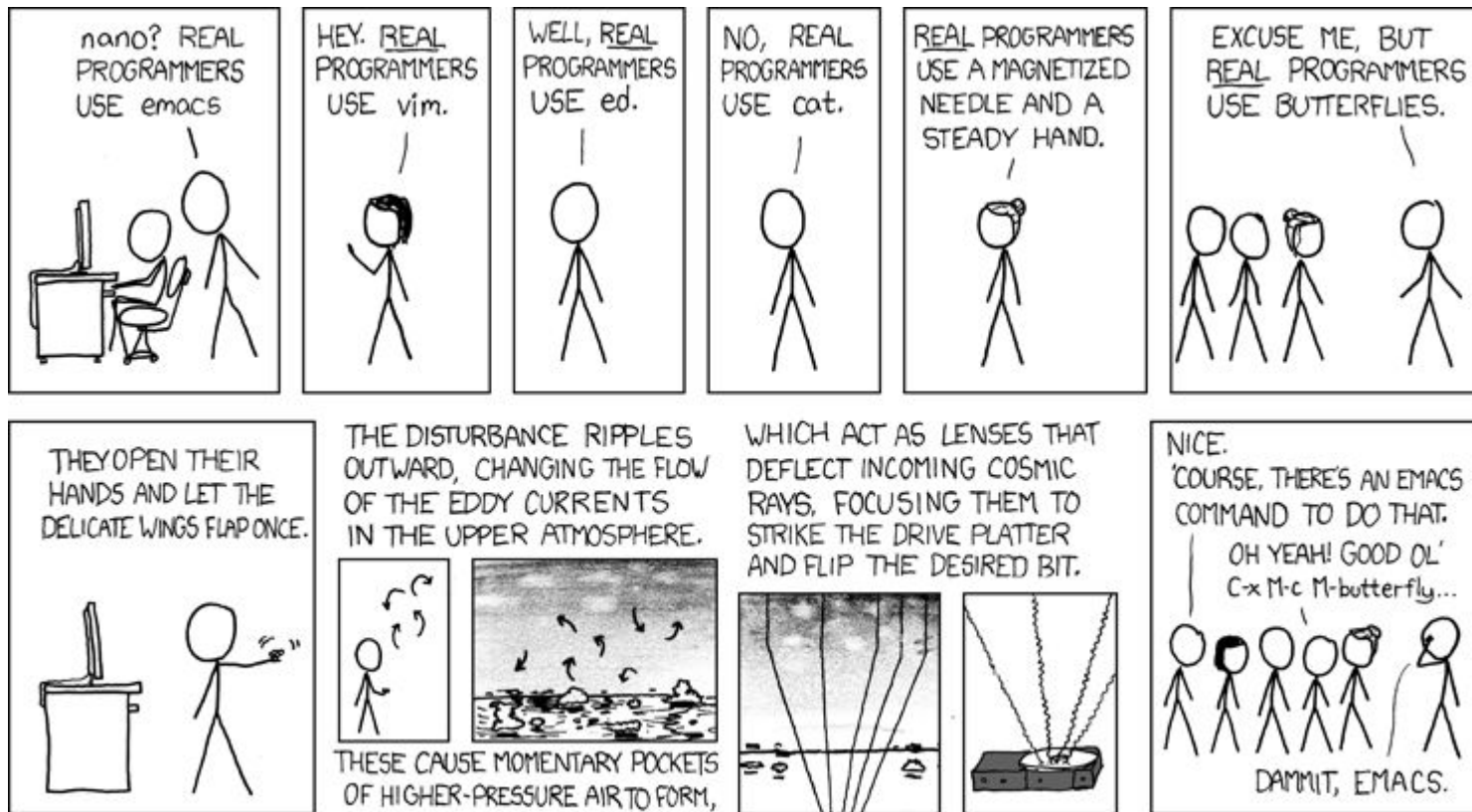
THAT'S A BATTERY STAPLE.

CORRECT!

DIFFICULTY TO REMEMBER: YOU'VE ALREADY MEMORIZED IT

THROUGH 20 YEARS OF EFFORT, WE'VE SUCCESSFULLY TRAINED EVERYONE TO USE PASSWORDS THAT ARE HARD FOR HUMANS TO REMEMBER. BUT EASY FOR COMPUTERS TO GUESS

REAL PROGRAMMERS



WORKFLOW

Speaking of emacs:



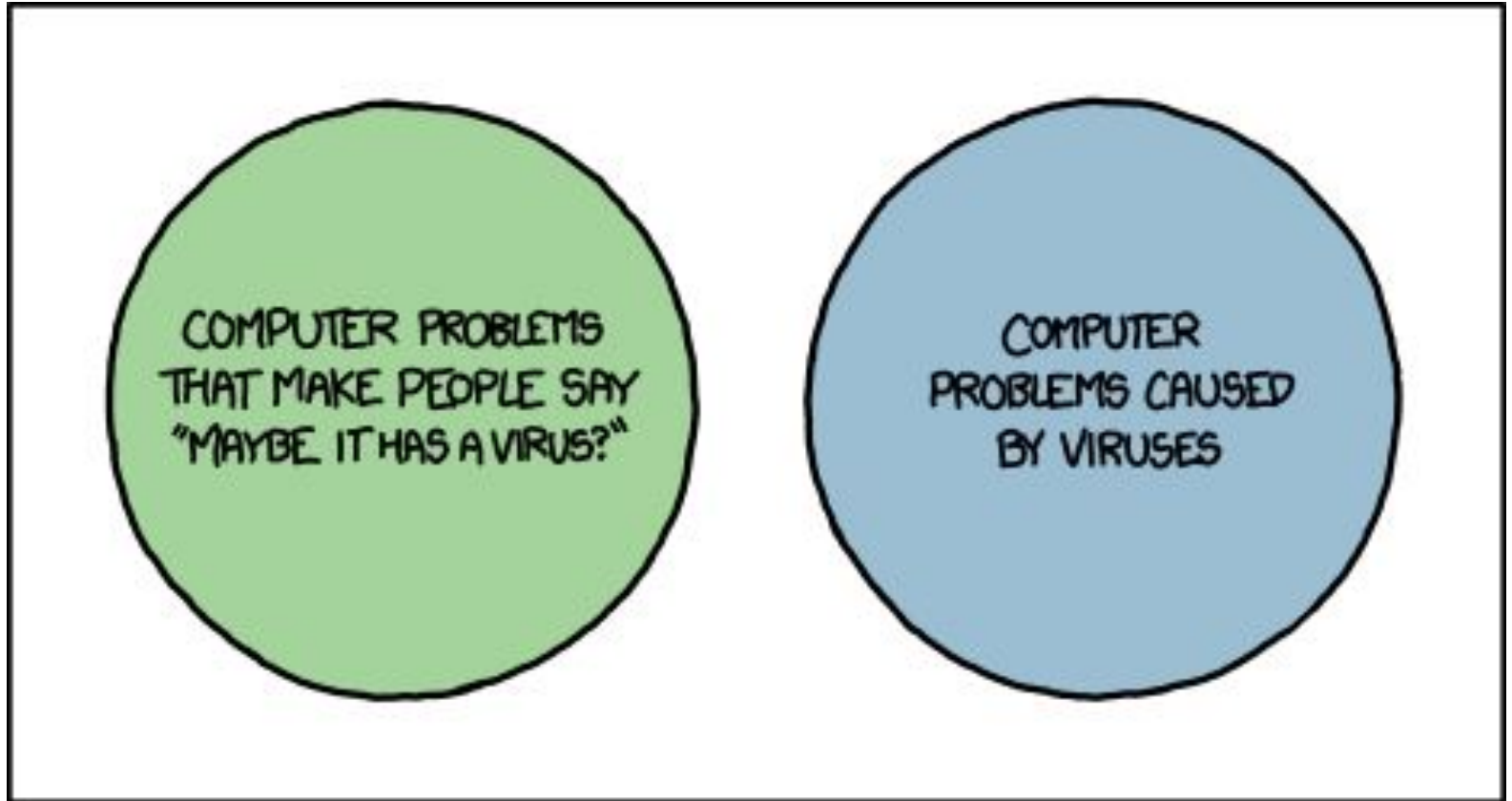
EVERY CHANGE BREAKS SOMEONE'S WORKFLOW.

COMPILING

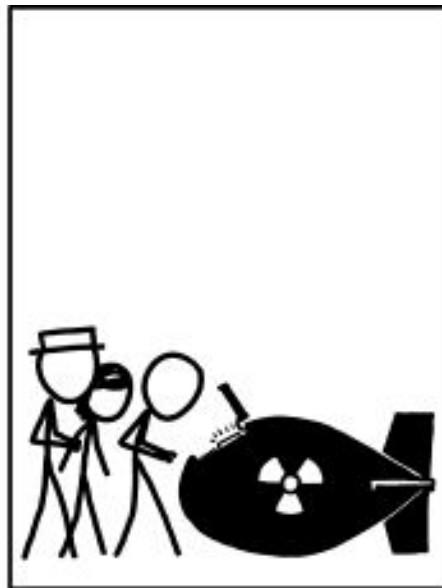
Maybe next: "Training"



VIRUS VENN DIAGRAM



TAR OR DIE

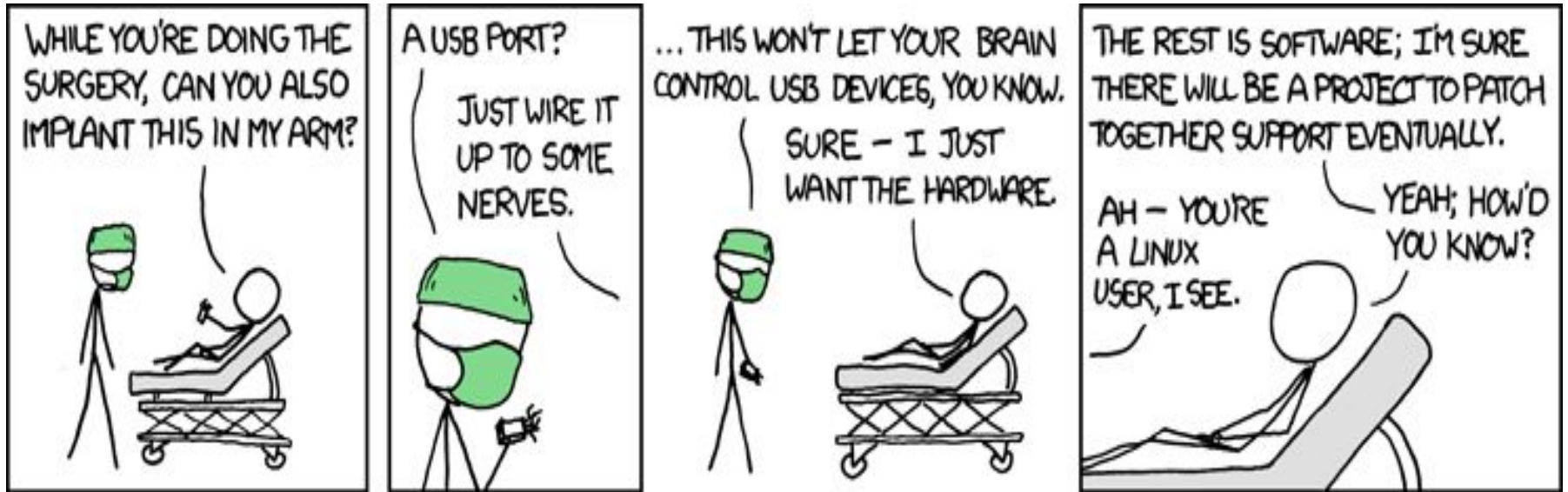


CAUTIONARY TALE ABOUT LINUX



PARENTS: TALK TO YOUR KIDS ABOUT LINUX.. BEFORE SOMEBODY ELSE DOES.

AH, LINUX



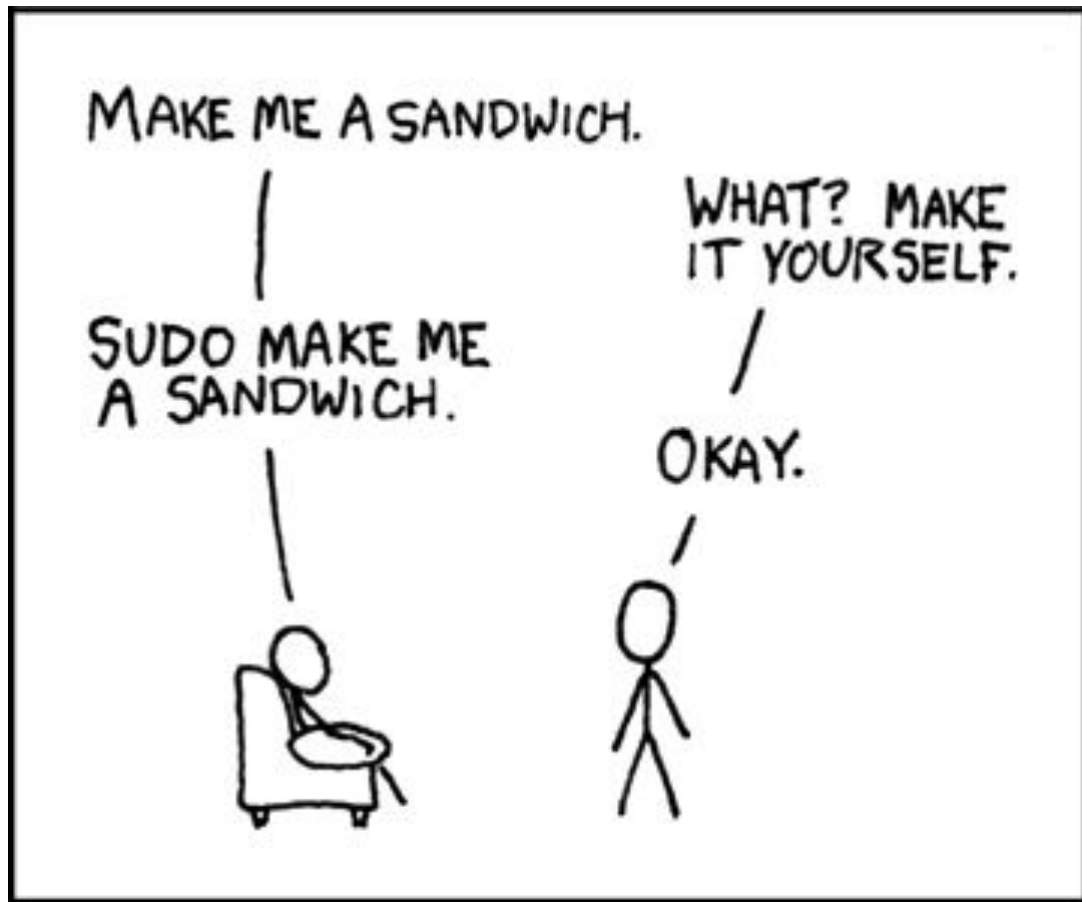
LINUX SUPPORT.....

Sometimes one must wonder
how many users need a
particular feature!

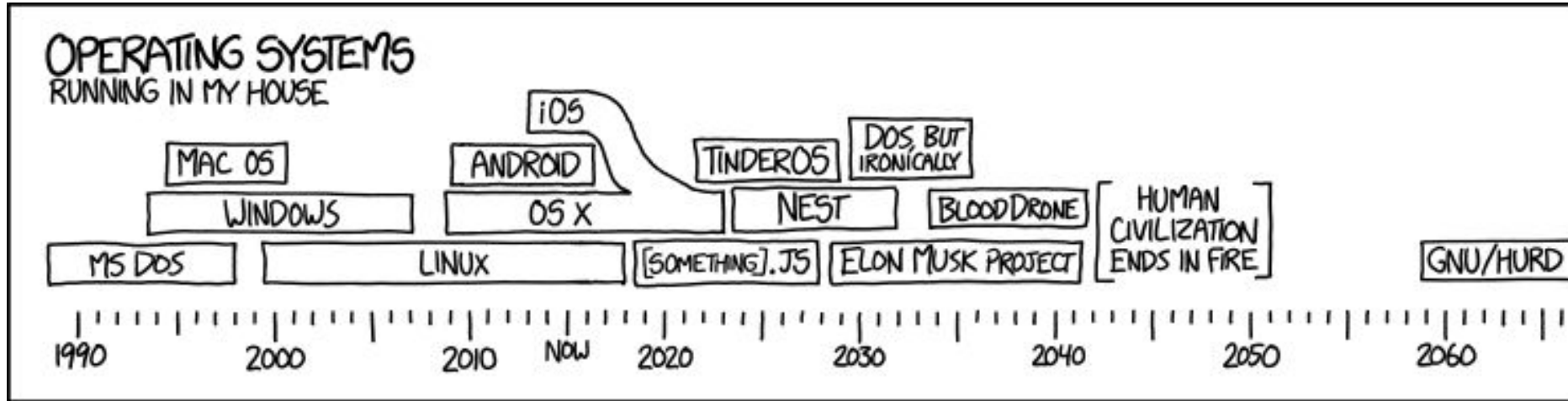


SUDO

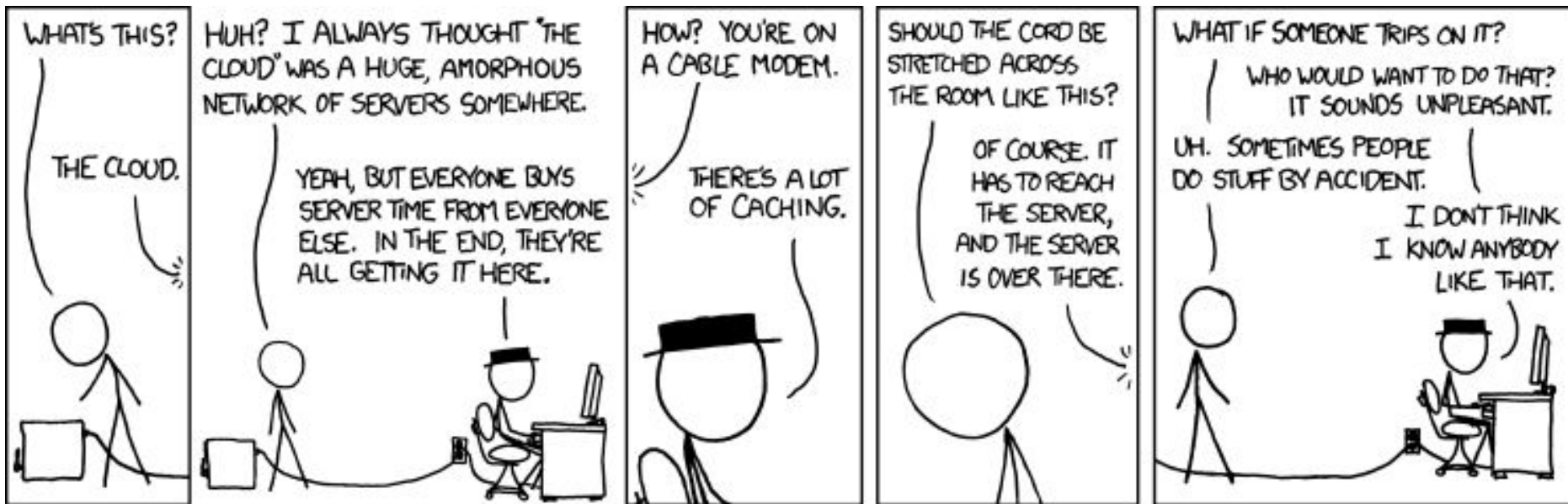
Thanks, Rafi, for the
shirt!



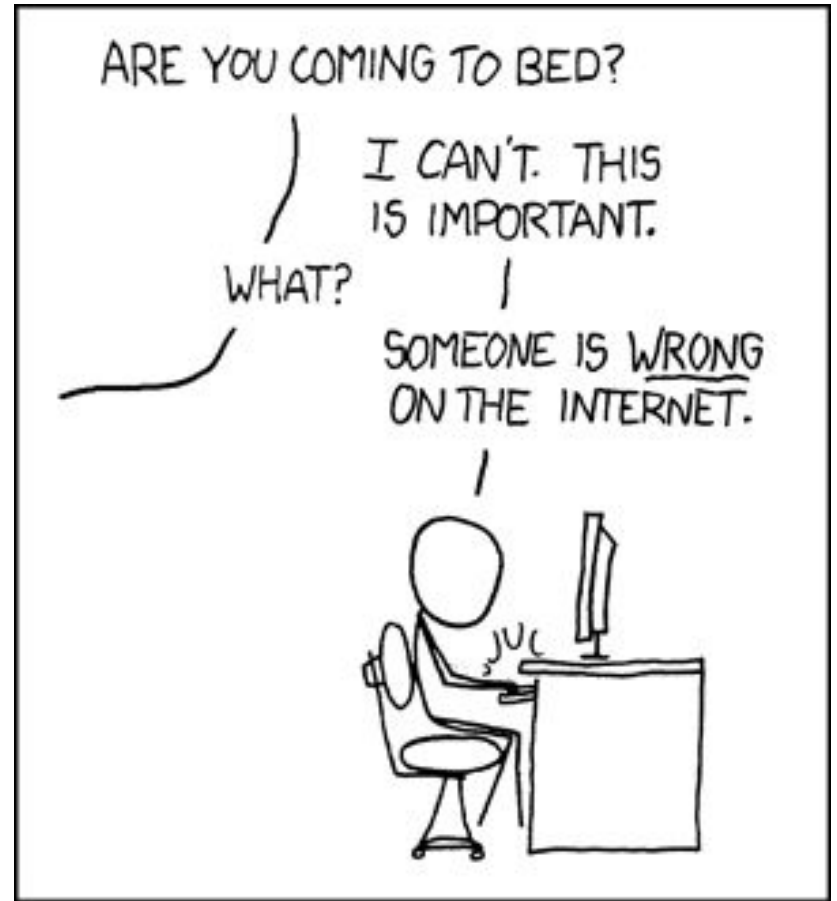
OPERATING SYSTEMS



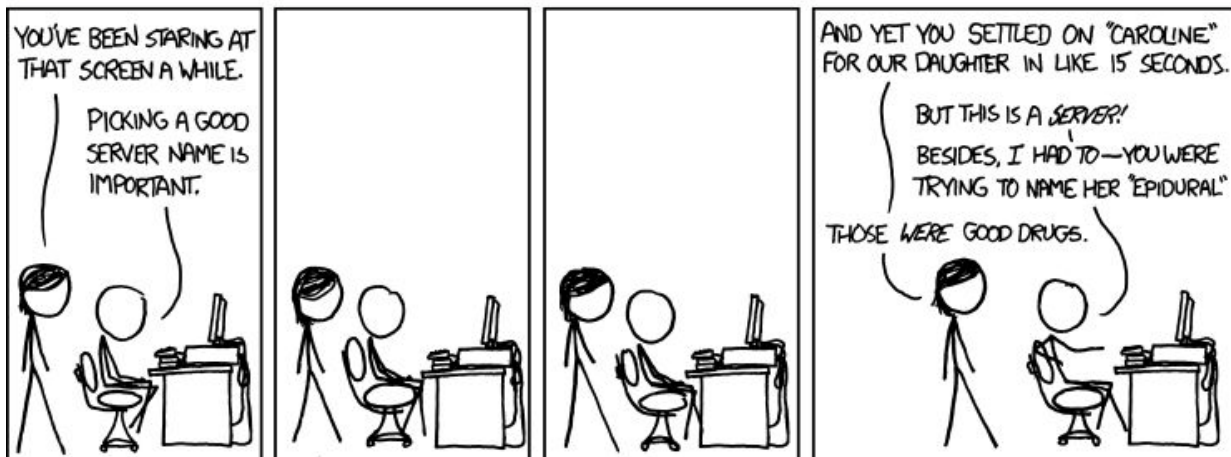
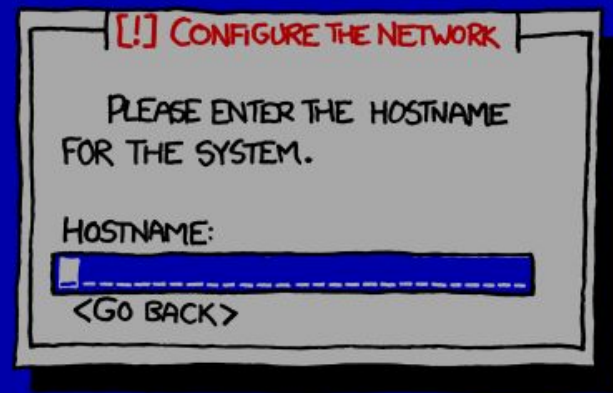
THE CLOUD



SOMEONE WRONG?



SERVER NAMES

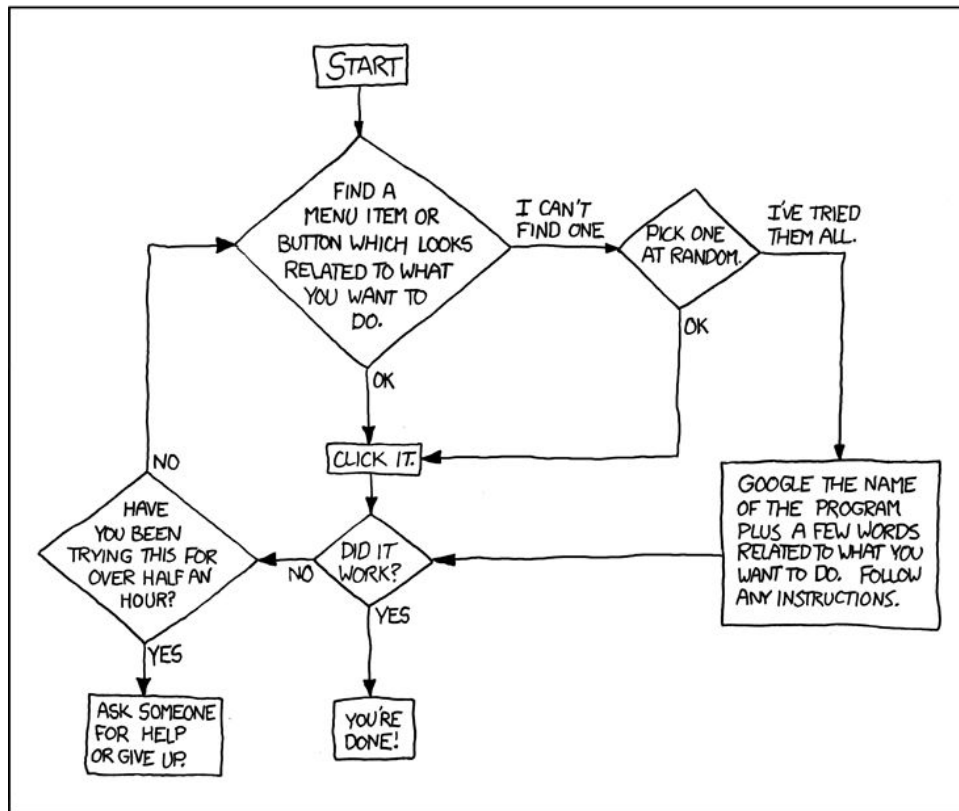


TECH SUPPORT

Mostly true...

DEAR VARIOUS PARENTS, GRANDPARENTS, CO-WORKERS,
AND OTHER "NOT COMPUTER PEOPLE."

WE DON'T MAGICALLY KNOW HOW TO DO EVERYTHING IN EVERY
PROGRAM. WHEN WE HELP YOU, WE'RE USUALLY JUST DOING THIS:



PLEASE PRINT THIS FLOWCHART OUT AND TAPE IT NEAR YOUR SCREEN.
CONGRATULATIONS; YOU'RE NOW THE LOCAL COMPUTER EXPERT!

TECH SUPPORT BY PHONE

... RESTART MY COMPUTER?
I KNOW YOU HAVE A SCRIPT
TO FOLLOW, BUT THE UPLINK
LIGHT ON THE MODEM IS GOING
OFF EVERY FEW HOURS. THE
PROBLEM IS BETWEEN YOUR
OFFICE AND THE MODEM.



MY COMPUTER HAS NOTHING
TO DO WITH ... OK, WHATEVER,
I "RESTARTED MY COMPUTER".
IT'S STILL DOWN, AND EVEN
IF IT COMES BACK, IT'S
GOING TO DIE AGAIN IN A
FEW HOURS, BECAUSE YOUR-



I DON'T HAVE A START MENU.
THIS IS A HAIKU INSTALL,
BUT THAT'S NOT IMPORT-
HAIKU? IT'S AN EXPERIMENTAL
OS THAT I ... OH, NEVER MIND.



I'M SORRY, BUT THIS WON'T GET
FIXED UNTIL I TALK TO AN ENGINEER.
CAN YOU LOOK AROUND FOR SOMEONE
WEARING CARGO PANTS, MAYBE A
SUBWAY MAP ON THEIR WALL?



THERE'S A CHICK TWO PHONES
OVER WITH A STUFFED PENGUIN
DOLL AND A POSTER OF SOME
BEARDED DUDE WITH SWORDS.

PERFECT. CAN YOU
PUT HER ON?

SURE



HEY, SO SORRY TO BOTHER
YOU, BUT MY CONNECTION—
YEAH, I SEE IT.
LINGERING PROBLEMS
FROM A SERVER MOVE.
TYPE TYPE
SHOULD BE FIXED NOW.



NO PROBLEM. HEY, IN THE FUTURE, IF
YOU'RE ON ANY TECH SUPPORT CALL, YOU
CAN SAY THE CODE WORD "SHIBBOLEET"
AT ANY POINT AND YOU'LL BE AUTOMATICALLY
TRANSFERRED TO SOMEONE WHO KNOWS A
MINIMUM OF TWO PROGRAMMING LANGUAGES.



SERIOUSLY?
YUP. IT'S A BACKDOOR
PUT IN BY THE GEEKS
WHO BUILT THESE PHONE
SUPPORT SYSTEMS BACK
IN THE 1990'S.

DON'T
TELL
ANY-
ONE.



OH MY GOD, THIS
IS THE GREATEST—
WHA—
... DAMMIT!



COMPUTER PROBLEMS



HUMAN SUBJECTS

WE'RE CONCERNED THAT SOME OF YOUR RESULTS MAY BE TAINTED BY THE FACT THAT YOUR HUMAN SUBJECTS ARE *AWFUL*.

WHAT DO YOU MEAN?



SEVERAL PARTICIPANTS IN YOUR DRUG TRIAL WERE ARRESTED FOR ARSON.

SIDE EFFECTS CAN BE UNPREDICTABLE.

THEY WERE IN THE CONTROL GROUP.



IN YOUR PRISONER'S DILEMMA STUDY, 80% OF THE PARTICIPANTS CHOSE TO BETRAY THEIR PARTNERS *BEFORE* THE EXPERIMENTER HAD A CHANCE TO TELL THEM ABOUT THE REWARD.

DEFINITELY TROUBLING.



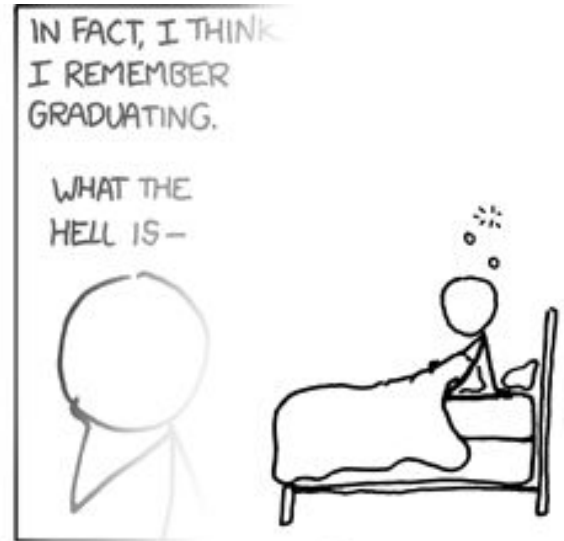
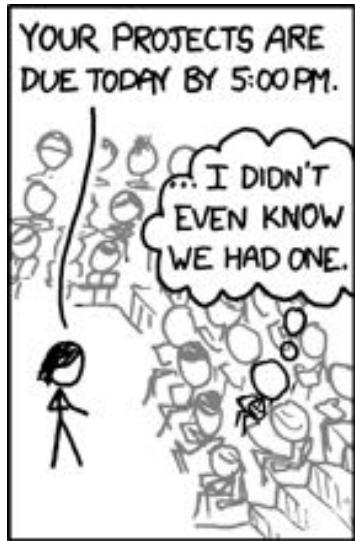
IN ONE EXPERIMENT, YOUR SUBJECTS REPEATEDLY GAVE ELECTRIC SHOCKS TO A STRANGER IN ANOTHER ROOM.

THAT'S A FAMOUS PSYCHOLOGICAL— THIS WAS A STUDY OF MOISTURIZING CREAMS!

YES, WE'RE NOT SURE HOW THEY SNUCK IN ALL THAT EQUIPMENT.



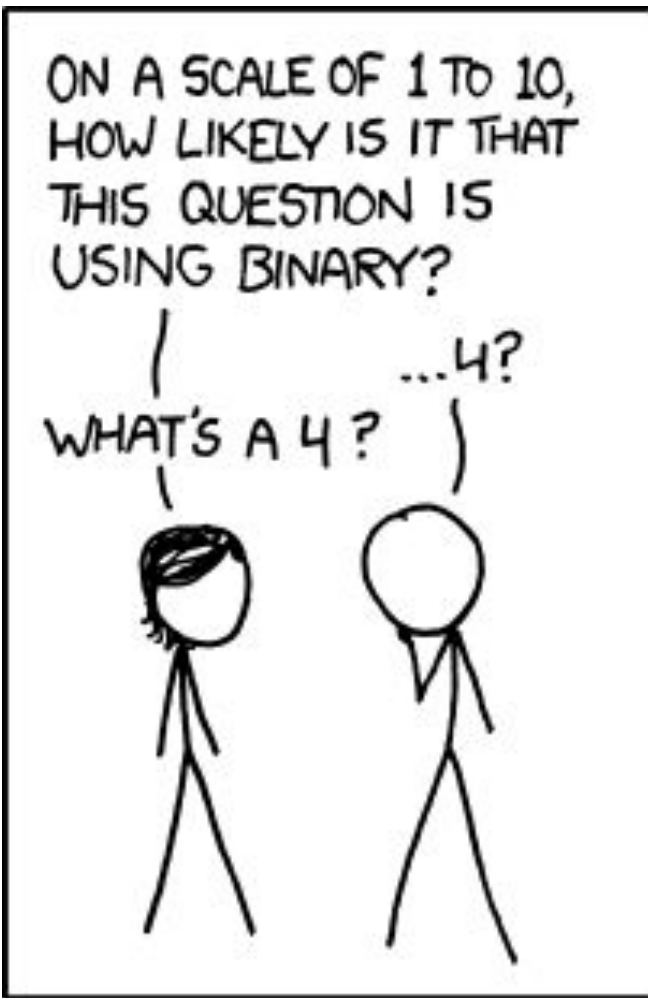
STUDENT NIGHTMARE....



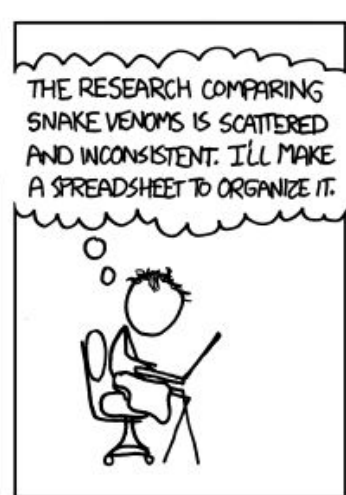
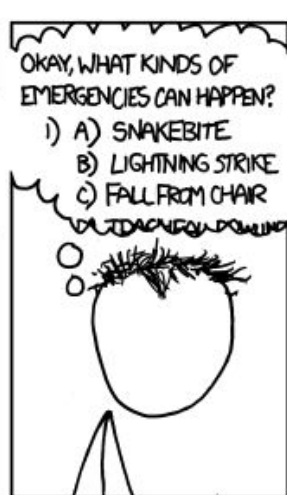
FUN FACT: DECADES FROM NOW, WITH SCHOOL A DISTANT MEMORY, YOU'LL STILL BE HAVING THIS DREAM.

CAN'T VOCALIZE THIS ONE:

MO: If you get an 11/100 on a CS test, but you claim it should be counted as a 'C', they'll probably decide you deserve the upgrade.



DFS

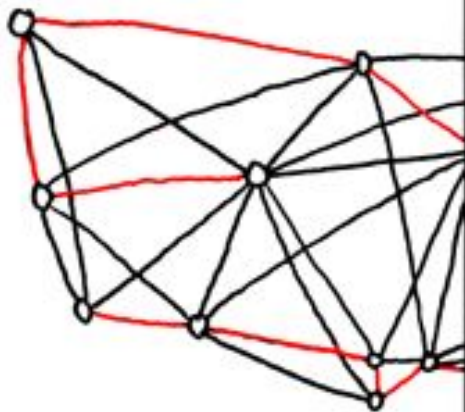


I REALLY NEED TO STOP USING DEPTH-FIRST SEARCHES

NON-TRAVELING SALESMAN PROBLEM.....?

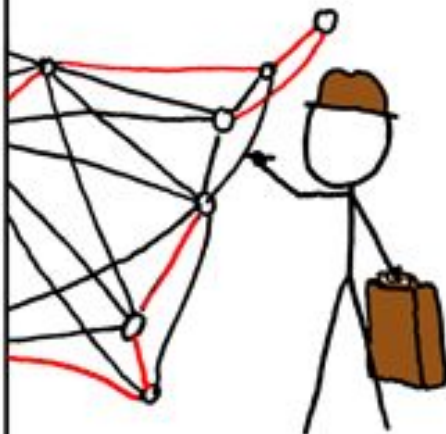
BRUTE-FORCE
SOLUTION:

$$O(n!)$$



DYNAMIC
PROGRAMMING
ALGORITHMS:

$$O(n^2 2^n)$$



SELLING ON EBAY:

$$O(1)$$

STILL WORKING
ON YOUR ROUTE?

SHUT THE
HELL UP.



STANDARDS....

AS A PROJECT WEARS ON, STANDARDS
FOR SUCCESS SLIP LOWER AND LOWER.

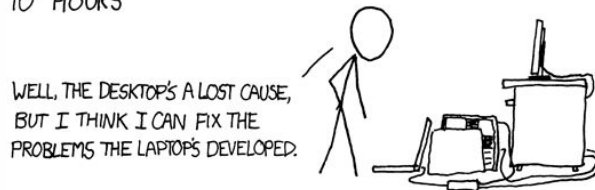
0 HOURS



6 HOURS



10 HOURS



24 HOURS



WHAT IF?

What if there was a robot apocalypse? How long would humanity last?

<https://what-if.xkcd.com/5/>