SIGPwny

Esoteric Languages

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WECEHACKS 2026

Software + Hardware
HACKATHON
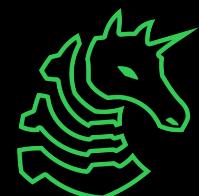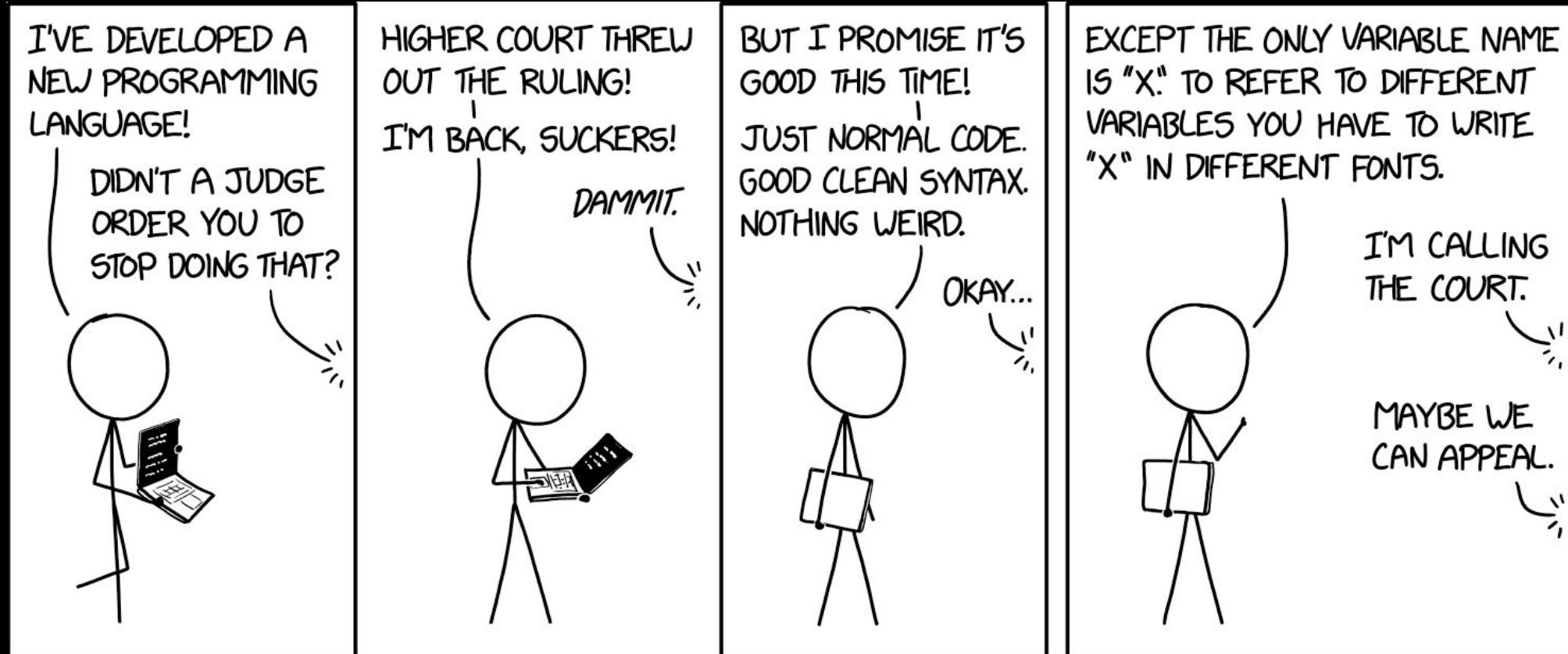
Feb 21-22

Join Us for a weekend Filled with crypto challenges, hardware, arduino, prizes, and more!

TREASURE MAP
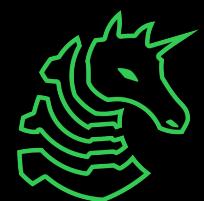
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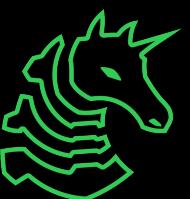
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Esolangs

What is an Esolang?

- People thought it would be funny to make a programming language as a joke
  - Have too much time on their hands - Pete
  - Highest form of programming arts - Henry
- **esolang** : a computer programming language designed to experiment with weird ideas, to be hard to program in, or as a joke, rather than for practical use – esolangs.org

Classic Esolang History

```
  DO FORGET expression
ABSTAIN (don't execute the referen
  DO ABSTAIN FROM (label)
or DO ABSTAIN FROM something + some
(as in DO ABSTAIN FROM CALCULATING)
REINSTATE (cancel out an ABSTAIN or
  DO REINSTATE (label)
or DO REINSTATE something + somethi
IGNORE (make a variable read-only,
  DO IGNORE variable + variable +
REMEMBER (cancel out an IGNORE)
  DO REMEMBER variable + variable
```

```
Code:      Pseudo code:
>>         Move the pointer to cell2
[-]        Set cell2 to 0
<<         Move the pointer back to cell0
[          While cell0 is not 0
  -            Subtract 1 from cell0
  >>           Move the pointer to cell2
  +            Add 1 to cell2
  <<           Move the pointer back to cell0
]          End while
```

Number Guessing Game (from 1 to 3)

```
>>v
v1?2v
   3
> > >: v
     |-&<
     $
    >"!tcerroC">:v
              |,<
              @
```

First Esolang: **INTERCAL**
(Compiler Language With No Pronounceable Acronym)
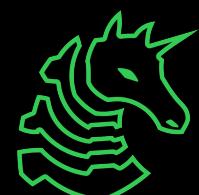
Most Well-Known Esolang: **Brainfuck**
- Simple plus/minus/move operations
- The flag for this meeting is the 'cat' program

2D Esolang: **Befunge**
- Follow the arrows for control flow
- If statements change the direction of the instruction pointer

There are a *lot* of esolangs

- We will be covering the important ones, like AMONGUSISABIGSUSSYBAKAHAHAHAAHA
- View a complete list at **esolangs.org**
- Are not guaranteed to be turing complete

Arch is the best! is a joke language that prints "Arch is the best!" regardless of the program. It has no syntax. It is a joke about the "Arch is the best" project⧉. I use Arch BTW.

| fuck | ∧ ∨ | ☐ Highlight All | ☐ Match Case | ☐ Match Diacritics | ☐ Whole Words | 1 of 164 matches |

They are also very civil, in case you haven't noticed. /s

- ALPACA
- AlPhAbEt
- AlphaBeta
- Alphabet Stew
- Alphabetti spaghetti
- Alphaprint
- Alphaton
- ALPL
- ALT-4
- /ˈæmbiːɛf/
- Amelia
- AMiaBF'!?
- Among Us
- AMONGUSISABIGSUSSYBAKAHAHAH
- Amycus
- Amycus Severus
- AnalLang
- Analogia
- Analytical Engine Programming Cards
- And
- Andrei Machine 9000
- Andromeda
- Anemone
- ANGL
- Anguish
- Animosian
- ANItka
- AnnieFlow
- Annihilator

- brainbool
- Braincells
- BrainClub
- Braincopter
- BrainCurry
- BrainCurses
- Braindumbed
- Brainfact
- brainfault
- BrainfisHQ9+
- Brain-Flak
- Brainflop
- Brainfoctal
- Brainfork
- brainfuckconsole74
- brainfuck
- Brainfuck++
- Brainfuck+10
- Brainfuck+3
- Brainfuck--
- brainfuck 4 humans
- Brainfuck Assembly Language
- Brainfuck But With Buffer
- Brainfuck Encoded Concatenative Calculus
- BrainFuckFart
- Brainfuckn't
- Brainfuck Substitutor
- BrainfuckXT
- Brainfuck/w/index.php?title=Talk:Brainfuck/in
- BrainFuck+
- BrainFuck++
- brainfunc
- brainfunct
- BrainFunge2
- Braingolf
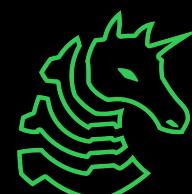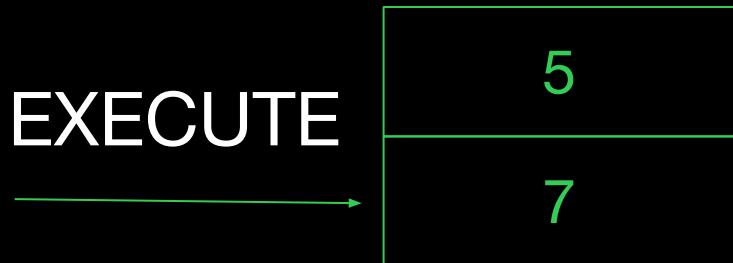
Stack-based Programming

- very simple to implement, most esolangs are stack-based
- uses a stack of values, and performs operations on the values
- Typically does not have memory you can read/write to

$y = 7$
$x = 2 + 3$

+
2
3
7

EXECUTE →

5
7
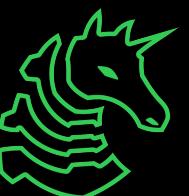
Esolang Examples

Unary

"According to the specification, Unary uses only one symbol."

Program that gets a single character and outputs it again

00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000

– no excuses for not programming even with broken keyboards
  – interpret each mouse click as a character
 – why aren't you a 1000x dev yet 🤔
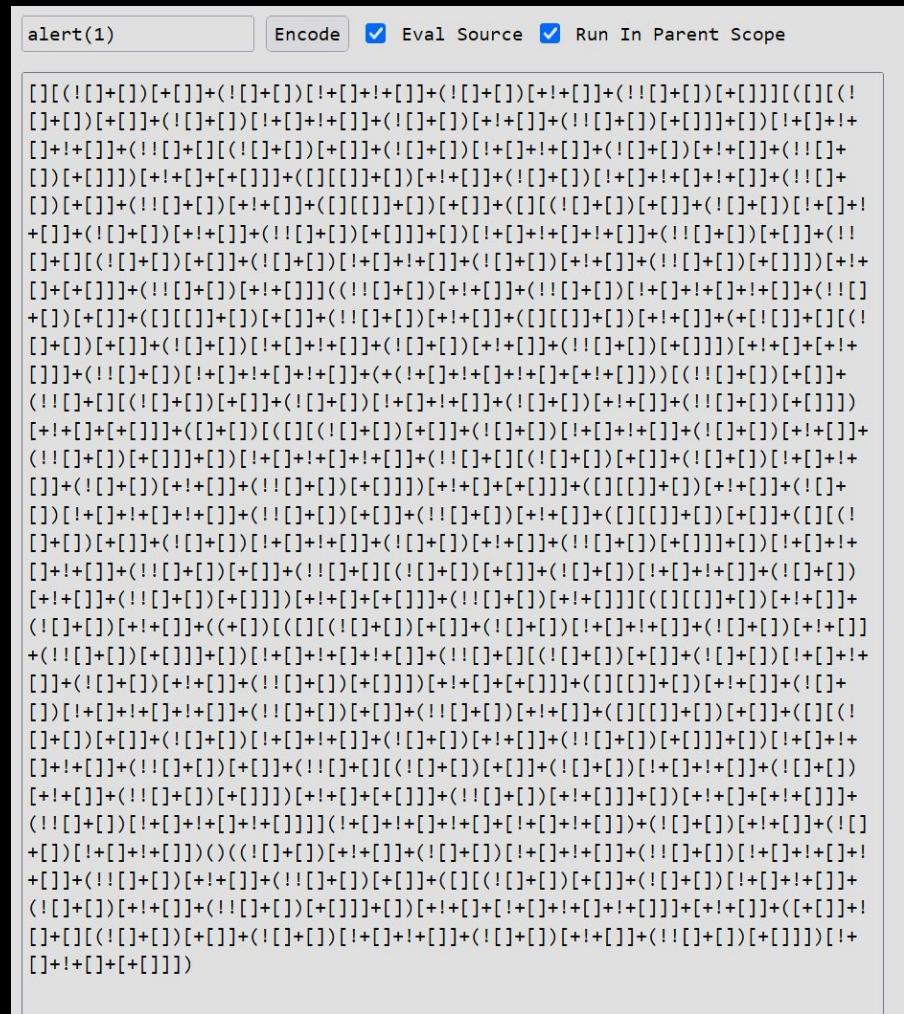
Hello, World has 142,209,095,870,573,693,396,245,504,627,320,468,349,603,549,841,832,242,891,887,476,756 zeroes

JS Fuck

- Esoteric subset of JS
- Common way to obfuscate web / JS challenges
- Uses only 6 characters ([ ] ( ) ! +)
- Abuses JS features like true + true = 2, and extract letters from "true", "false", etc
- jsfuck.com
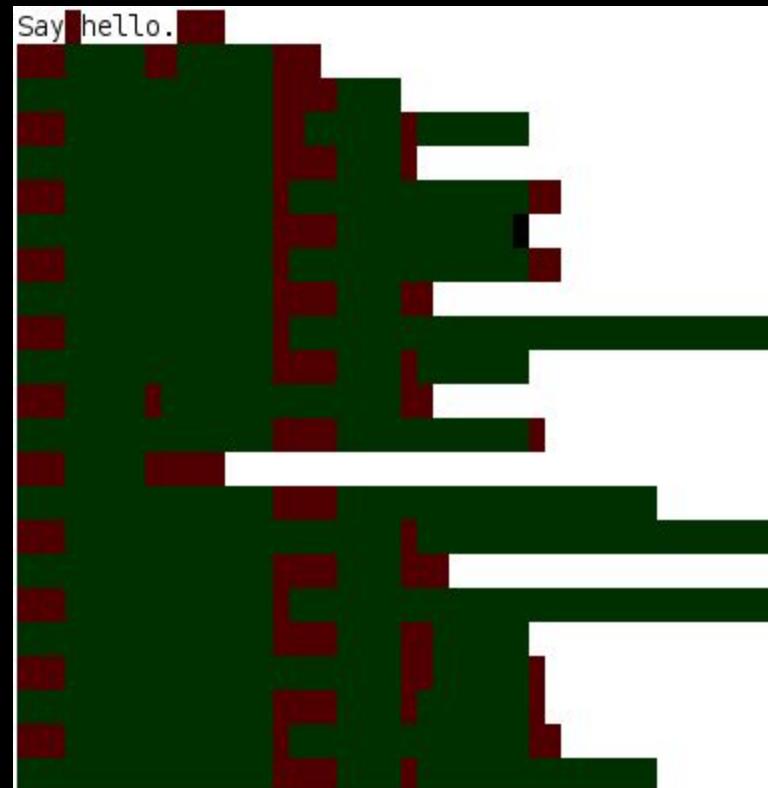
Whitespace

- Each whitespace character (space, tab, linefeed) is a different operator

- Common CTF language

- Stack-Based

- e.g. [Space] = PUSH

Malbolge

- Designed to be impossible (or at least very hard) to program

- First program written by **brute-forcing** a set of constraints (article)

- After each instruction, runs the "Crazy operation"

 - Completely changes the instruction set based on what instruction was just ran

Hello, World! [edit]
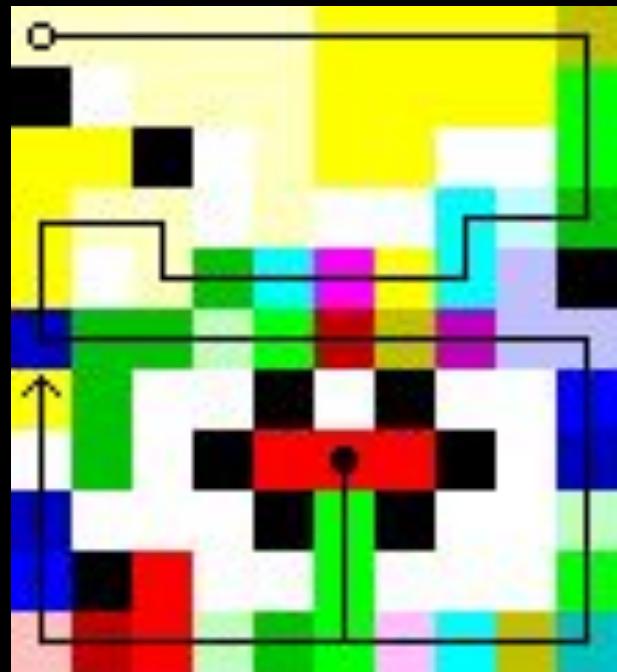
This program displays "Hello, World.".[9]

```
(=<`#9]~6ZY327Uv4-QsqpMn&+Ij"'E%e{Ab~w=_:]Kw%o44Uqp0/Q?xNvL:`H%c#DD2^WV>gY;dts76qKJImZkj
```

Piet

- 2D stack-based programming language
- Pixel difference correlates to opcode (which operation is run)
- Ran a challenge for UIUCTF 2022 in Piet
  - Challenge: automate reverse-engineering piet programs
  - [Solution](): trace execution, and reverse program from execution

Wenyan-lang 文言

- The alphabet of wenyan contains only traditional Chinese characters and 「」 quotes. (Yes, even numbers and operators.)
- Wenyan is javascript-based, but can be cross-translated into Ruby and Python. It also has an online IDE with crazy examples.
- Go do my <u>Ancient Scroll of Wisdom</u> challenge!

Hexagony

- 2d grid esolang
- [code golfing writeup](#)
- [HexagonyColorer](#)
- [Online interpreter](#)
- Look at these visuals!

Uua

- a general purpose, stack-based, array-oriented programming language
- Uua designates special glyphs for all the operations, and it's generally all in one line.
- Code runs from right to left, top to bottom, with only one precedence rule.
- It does support many cool features though, like Multimedia output.

Catala

- a language adapted for socio-fiscal legislative literate programming.
- This was developed because tax code is too complex, so we can apply programming to laws
- At its core, we have conditions and consequences for each law, and each law has a base case and exceptions to it.

(A) $500,000 Limitation for certain joint returns *Paragraph (1) shall be applied by substituting "$500,000" for "$250,000" if— (i) either spouse meets the ownership requirements of subsection (a) with respect to such property; (ii) both spouses meet the use requirements of subsection (a) with respect to such property; and (iii) neither spouse is ineligible for the benefits of subsection (a) with respect to such property by reason of paragraph (3).*
(B) Other joint returns *If such spouses do not meet the requirements of subparagraph (A), the limitation under paragraph (1) shall be the sum of the limitations under paragraph (1) to which each spouse would be entitled if such spouses had not been married. For purposes of the preceding sentence, each spouse shall be treated as owning the property during the period that either spouse owned the property.*

US Tax Code, Section 121, (b), (2)

```
scope Section121TwoPersons:
  rule section_121_b_2_A_condition under condition
    (return_type with pattern JointReturn of data_couple) and
    (section121Person1.requirements_ownership_met or
      section121Person2.requirements_ownership_met) and
    (section121Person1.requirements_usage_met and
      section121Person2.requirements_usage_met) and
    (not (section121Person1.section_121_b_3_applies)) and
    (not (section121Person2.section_121_b_3_applies))
  consequence fulfilled
  exception rule section121a_requirements_met under condition
    section_121_b_2_A_condition
  consequence fulfilled
```

Additional information

How to identify an esolang

- … Pretty hard!
- Google-fu or ChatGPT for series of operations in the code + "esolang"
- Use lists of esolangs online
- Use the list of popular languages on esolangs.org, or the esolangs.org IRC chat

Meeting Challenge - Identify This

```
HAI 1.3
O HAI IM pile
        I HAS A length ITZ 0
        I HAS A max ITZ -1

        HOW IZ I pushin YR item
                DIFFRINT ME'Z max AN BIGGR OF ME'Z max AN ME'Z length, O RLY?
                        YA RLY, ME HAS A SRS ME'Z length ITZ item, ME'Z max R SUM OF ME'Z max AN 1
                        NO WAI, ME'Z SRS ME'Z length R item
                OIC
                ME'Z length R SUM OF ME'Z length AN 1
        IF U SAY SO

        HOW IZ I popin
                DIFFRINT ME'Z length AN 0, O RLY?
                YA RLY
                        ME'Z length R DIFF OF ME'Z length AN 1
                        I HAS A item ITZ ME'Z SRS ME'Z length
                        ME'Z SRS ME'Z length R NOOB
                        FOUND YR item
                OIC
        IF U SAY SO

        HOW IZ I gettinLen
                FOUND YR ME'Z length
        IF U SAY SO
KTHX
```
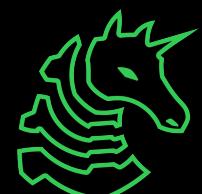
My interpretations of Esolang

Esoteric form (Looks like an esolang)

Uiua (Fancy alien-like script symbols, but can be very useful in certain applications)	Brainfuck (Looks complex but the operations are fairly simple to understand)	LLVM IR (Not an esolang per se, it's just compiler gobbledygook)
Conway's Game of Life (Technically Turing complete am I right?)	Python Pickle (It's not just a serialization tool. It contains a Turing Complete stack-based VM)	C (Has a bunch of cursed features and functions, and can be as memory-unsafe as you want)

The universe (Really. You can build a computer with anything that has statistical convergence and state transitions. See water computer from Steve Mould)	PowerPoint and Excel (Yes, you can build Turing machines and even 16 bit computers in powerpoint and excel)	Javascript
		
		`> "0" == 0` `> "0" == []`
		`< true` `< false`
		`> 0 == []` `> "0" >= []`
		`< true` `< true`

Esoteric behavior (Runs like an esolang)

My interpretations of Esolang

Readability
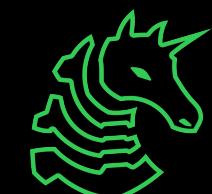
Read-only (need documentation to write in it, becomes writable given enough practice) e.g. assembly and COBOL	"True" esolangs (You either really like esoteric languages or are doing ctfs) e.g. Malbolge and Brainfuck
Standard programming languages e.g. Python and Rust	Write-only (You can write stuff but it's hard to remember what it does without comments) e.g. Uiua, C, Catala
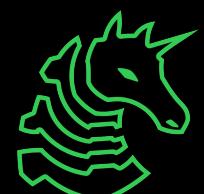
Writability

What did we learn…

- Everything can be an esolang if you try hard enough
- Or rather, everything can be programmed if you try hard enough, you just have to find how to program it.
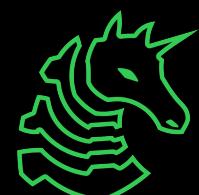
Next Meetings

2026-02-15 • **This Sunday**

- PWN IV (Heap)
- Learn heap vulnerabilities and strategies to get code execution!

2026-02-19 • **Next Thursday**

- Password Cracking
- Learn how to store passwords securely and crack them hashed with insecure algorithms!

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Meeting content can be found at
sigpwny.com/meetings.

SIGPwny