

Code Games

Or How I Learned to Stop Worrying and Love to Code

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Topics

- Learning New Languages
- Esolangs
- Code Puzzles
- Code Golf
- Actual Computer Games

New Languages

- Learning a new programming language keeps your mind sharp
- Teaches new ways to do things
- New ways to think about coding
- Some people say you should learn one new language a year

Programming Languages

QL	0815	360 Assembly	4D	4DOS Batch	6502 Assembly	6800 Assembly	68000 Assembly	8 1/2	80386 Assembly	8051 Assembly
8080 Assembly	8086 Assembly	8th	A+	ABAP	ACL2	Action!	ActionScript	Ada	Agda	Agda2
Agena	Aikido	Aime	Algae	ALGOL	ALGOL 60	ALGOL 68	ALGOL W	ALGOL-M	Alice ML	Alore
AmbientTalk	AmigaE	AMPL	AngelScript	ANT	AntLang	ANTLR	Apex	APL	App Inventor	AppleScript
Applesoft BASIC	Application Master	Apricot	Arbre	Arc	Arendelle	Argile	ARM Assembly	ASP	ASP.NET	AspectC++
AspectJ	Assembly	Astro	Asymptote	ATS	AutoHooky	AutoLISP	AutoLISP	Asx	Awom	Awom
Atom	BCPL	BAJ	Babel	BASIC	Batch	Batch File	Battlestar	BBCC BASIC	BBCC	BBC
Brace	Beeswax	Befunge	Beta	Biferno	Binary Lambda Calculus	BlitzMax	BML	Boo	Bori	Bori
COH	Bracmat	Brainf***	Bitron	Bricad	Burlesque	C sharp	C Shell	C++	C++/CLI	C++/CLI
Chief	C1R	Caché ObjectScript	Brat	Caml	Cat	CB80	Cduce	Cecil	Chapel	Chapel
Clojure	CHR	Chuck	CafeOBJ	Clk	Clarion	Clay	Clean	Clipper	ClipperXBase++	CLIPS
Component Pascal	CMake	COBOL	Cobra	Coco	CoffeeScript	ColdFusion	Comal	Cornelmon0x10	CommonDore BASIC	Common Lisp
Coq	Computerzero Assembly	Coq	Crack	Crystal	Curry	D	Dairy	Dao	Dart	Datalog
DOL	Dylan	DDMC	Delphi	Deluge	Div Games Studio	D	DM	DMS	Deed0	Deed0
DWScript	Dylan.NET	Dylan.NET	DÄ&JÄ Vu	E	EC	EchoLisp	ECL	EDSAC order code	Earo	Elene
Egison	EGL	EBASIC	Eiffel	Ela	Elan	Elastic	Elena	Elisa	Elkix	ELLA
Elm	Emacs Lisp	Epiqram	Erlang	ERRE	Es	ESQL	Euler	Euphoria	Ezlib	F
F Sharp	Factor	Falcon	Fan	Fancy	Fancyp	Fantom	FAUST	FBSL	FeatureC++	Felix
Ferite	Fekl	Fish	FLARE	FOCAL	Ford	FormulaOne	Forth	Fortran	Fortress	FP
FPI	Free Pascal	FreeBASIC	FreeMat	Frege	Frege	Frink	FRISC Assembly	FuRL	Futhark	FutureBasic
FUZZ BASIC	Gambas	GAP	Gasha	Geocho	Gemma	Genzee	Genyris	GEORGE	GFA Basic	Glang
GLBasic	Gitee	GLSL	GnuPlot	GnuPlot	Go	Go!	Golo	Go	Go	Gosu
Gri	Groovy	GUISS	GW-BASIC	Hack	Halon	Harbour	Haskell	Haxe	Heron	HiCEst
HLA	HolyC	Hoon	HOPE	HPPPL	HQ9+	Hy	HyperTalk	Icon	Icon	IDL
Idris	Inform 6	Inform 7	Informix 4GL	Integer BASIC	Intercal	Io	Io	Ipscrae	IBASIC	IBASIC
Jabaco	Jack	Jacquard Loom	JAMES II/Rule-based Cellular Automata	Java	JavaFX Script	JavaScript	JoCaml	JoCaml	JOVIAL	Joy
Jq	JScript.NET	JudoScript	Julia	K	Kamailio Script	Kaya	Kite	Kitten	Klong	Klong
KenshoScript	Kotin	L	Lin.oleum	LabelVIEW	Lambda Prolog	Lamp	Lang	LC2000 Assembly	LC2000 Assembly	LC2000 Assembly
LC3 Assembly	Leon	LFE	Lingo	Liberty BASIC	LibreOffice Basic	Lilypond	Lisp	Lissac	Lisp	Lisp
Lisp	LiveCode	LiveScript	LLP	LIVM	Labster	Locomotive Basic	Log	Logtalk	LOLCODE	LOLCODE
Lolli	Lotus 123 Macro Scripting	LotusScript	LSE64	Lout	Lucid	Lucid	Logo	Lush	Lush	Lush
M4	M680x0	Make	Maple	MALBOLGE	MAPPER	Mathematica	Mathprog	MATLAB	Maude	Maxima
MAXScript	MEL	ME10 macro	Mercury	MEL	Metafont	Metapost	MGS	MINIL	MIPS Assembly	Mirah
MIRC Scripting Language	MLI	MLI	MLite	MMIX	Modula-2	Modula-3	Mond	Monicelli	Monkey	Monte
MOO	Moonscript	Morfia	MSX Basic	MSX Basic	Myrtle	MyrtleScript	MySQL	Mython	NhTrot	NhTrot
Neat	Neat	Nemerle	Nemerle	MESL	NetLogo	NetLogo	NextLisp	NewtonScript	Nial	Nial
Nice	Nickle	Nim	Nit	Niue	Nix	NOP	NSIS	OASYS	OASYS Assembler	Oberon-2
Objekc	Object Pascal	ObjectIcon	Objective-C	Ocaml	Occam	Octave	Oforth	OI	Omega	Onyx
OOC	OOCalc	OoRexx	Opa	OpenC++	OpenEdge/Progress	OpenLisp	Openscad	OPL	Order	OxygenBasic
Oxygene	Oz	PARI/GP	Pare	Pascal	Pascal	PASM	PDP-11 Assembly	Peloton	Pentium Assembly	PeopleCode
Perl	Perl 6	Perl5i	Phix	PHP	PHP	Picat	PicoLisp	Pict	Piet	Pike
PILOT	PIR	PLM	PLM	PL/SQL	PL/SQL	Plain TeX	Plan	PLUG	PLZ/SYS	Pony
Pop11	PostScript	Poticon	POV-Ray	PowerShell	PowerShell	PowerShell	PPC Assembly	PPL	Processing	ProDOS
Prolog	PSOL	Pure	Pure Data	Purity	Purity	Pyret	Python	Q	Q	Qore
QuakeC	Qmail	R	Racket	Rapira	Rapira	Rascal	Raven	Rascal	REALbasic	Reason
REBOL	Red	Reduce	Refal	REXX	Retro	Ring	RLaB	Ring	RLLS	Robotic
RPG	RPQIV	RPL	RPL/2	Ruby	RTL/2	Rubylog	Run BASIC	Rust	S-lang	S-lang
Sage	Salmon	SAS	Sather	Scheme	Scala	Scratch	Script Basic	Script3D	ScriptBasic	ScriptBasic
Sci	Seed7	Self	SequencerL	Set lang	Set lang	SheerPower 4GL	Shen	Shiny	Shiny	Sidaf
SIMPOL	Simula	Sinclair ZX81 BASIC	Sinclair ZX81 BASIC	SkookumScript	SkookumScript	Smart BASIC	Smart BASIC	SmileBASIC	SmileBASIC	SmileBASIC
SNOBOL4	SNUSP	Soar	SoneKing Assembly	SPARC Assembly	SPARC Assembly	SPARK	Sparkling	SQL	SQL	SQL
Squirrel	SSEM	Standard ML	Star	StreamIt	StreamIt	Suneido	Superbase BASIC	SuperCollider	Supernova	Swift
Symsyn	SystemVerilog	TAL	Tcl	Teco	Teco	TeLa	Terra	TestML	Thistle	Thyrd
TI-83 BASIC	TI-89 BASIC	TI-89 BASIC	TiScript	Toka	Toka	TorqueScript	TPP	Transact-SQL	TransFORTH	Trith
True BASIC	TSE SAL	Turing	TUSCRIPT	TWR	TWR	TypeScript	UC++	Unicon	Uniface	UNIX Shell
UnixPipes	Uniambda	Ursa	Ursula	UScript	UScript	UserRPL	V	VAX Assembly	VBA	VBA
VBScript	Vedit macro language	Verbeex	Verilog	VHDL	VHDL	Verilog	Visual Basic .NET	Visual FoxPro	Visual Prolog	Visual Prolog
Viva VM assembly	Verpal	Vex	VRML	Wart	Wart	WDTE	Whenever	WhiteSpace	Wolfram Language	Wolfram Language
Wollot	Wortel	Wren	X10	X86 Assembly	X86 Assembly	Xanadu	XBase	XLSP	XLSP	XLSP
Xojo	XPath 2.0	XPL0	XProc	XQuery	XQuery	XSLT	XSLT 1.0	XSLT 2.0	XTalk	XUL
Ya	Yacas	Yorick	Z80 Assembly	ZED	ZED	Zonnon	ZPL	MC++	MC++	MK-61/52

Programming Paradigms

Imperative	Interpreted	Extensible
Functional	Compiled	Threaded
Object Oriented	Dynamic	Array
Strutured	Scripting	List oriented
Procedural	Prototyped	High-Level
Reflective	Stack-based	Low Level
Concurrent	Concatenative	Esoteric

New Language, New Methods

- Learning a new language can introduce you to new ways to solve problems.
- Things which are simple in your language may now be hard to do.
- Things hard in your language may be simple to do.
- Can learn to use arrays effectively.
- Encapsulation of data with objects.
- Using pointers effectively.
- May find new language to fit the job.

Right Language, Right Job

- Some languages handle some jobs better (this is a fact)
- Exploring languages allows you to choose the right language!
- Also helps plan code better, how different languages handle different problems, like interfaces.
- Interoperability might allow you to use those languages together with your primary language.
- If not, maybe some parts could be off-loaded to other programs!

Wrong Language, Wrong Job

- Sometimes there's something you'd like in a language that doesn't exist!
- Hashes in Fortran? 2-D array handling in C?
- Writing these things for yourself can help you understand what they mean, how they work and if they go wrong, why they go wrong!

Really Wrong Language, Really Wrong Job

- Can take this to the extreme!
- Many languages Turing complete!
- 99 Bottles of Beer song in LaTeX? Tetris in Sed? See : sedtris

```
\documentclass{article}
\newcounter{beer}
\newcommand{\verses}[1]{
  \setcounter{beer}{#1}\par\noindent
  \arabic{beer} bottles of beer on the wall ,\
  \arabic{beer} bottles of beer !\
  Take one down, pass it around---\
  \addtocounter{beer}{-1}
  \arabic{beer} bottles of beer on the wall !\
  \ifnum#1>0 \verses{\value{beer}} \fi
}
\begin{document}
\verses{99}
\end{document}
```


Puzzled by Esolangs

- May limit commands permissible.
- May obscure commands as single characters.
- May allow non ordered code.
- May not contain usual things like arrays or even floats.
- Have to overcome these challenges.

More Puzzles

- Several websites offer coding challenges
- Project Euler, Rosetta Code
- Great way to learn new languages!
- Can contribute to develop problems.

Project Euler

- Ever growing compendium of mathematical challenges
- Every problem should be possible to solve in ~ 1 min of runtime
- Can complete in any language and submit your answer and compare with others.

Rosetta Code

- Wiki containing problems to be solved.
- Language specific “best” answers to problem.
- Problems spanning all areas of programming.

Fore(tran?) – Code Golf

- Competition to create code in as few bytes as possible
- All languages welcome, some specifically designed for golfing
- May force you to solve a problem in an odd way to reduce size
- Online communities with thousands of problems to tackle

```
$v=0;$t=3;$r=1e2;$n=$r**2;@a=(1)x$n;for(1..1e6){$==rand$n;$q=2*$a[$=];$b=0;$b+=$a[$=+$_%$n]for($r,-$r,1,-1);$a[$=]*=$q*($b+$v)>0&&rand>exp-$q*$b/$t?1:-1;$_=$n||print eval(join'+',@a),$/}
```

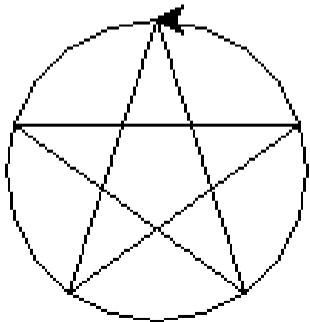
Corporate Shill?

- Many programming games available:
- TIS-100
- Shenzhen I/O
- Opus Magnum
- Silicon Zeroes



Drawing Pictures

- Many languages support graphics
- Almost all languages support output of numbers – PNM graphics
- Some work like turtle draw
- Some work on bitmaps



Your challenge

- I have provided you with a Javascript module and example code which can draw things along with documentation
- Your challenge is to produce something pretty.
- Some ideas as to what that might be:
 - Easy – Spirograph, Koch curve, Diffusion Limited Aggregation, Fourier Phase
 - Medium – Lindenmeyer System, Conway's Game of Life
 - Hard – Mandelbrot/Julia Set, Maze Generator

References

- Several examples of code taken from Rosetta Code
- `gallery.nen.gov.uk`
- `cs.roanoke.edu`