



1975

LISP: 1958

Scheme/LISP

A functional and dynamically typed language with good support for lists and higher order functions.

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CMPT 383
Summer 2022
SFU Surrey

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What was going on in 1975?
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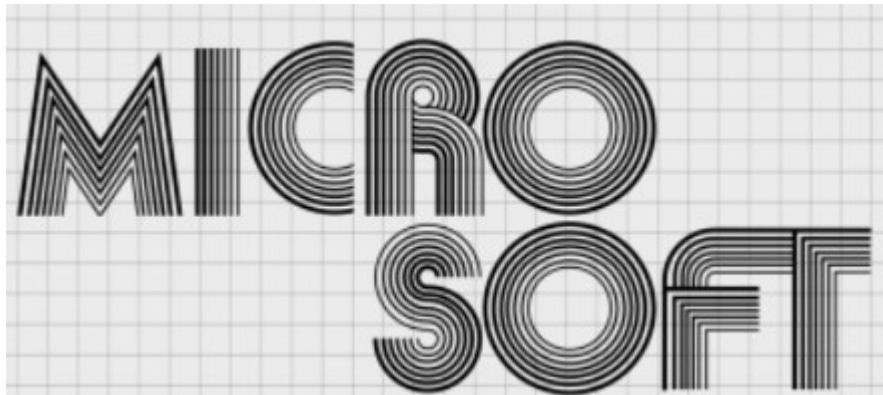
1975: First Appearances



Cromemco Cyclops
First all-digital camera
32x32 pixel resolution



Betamax and VHS
Consumer video recorder formats



```
.run adven

WELCOME TO ADVENTURE!!  WOULD YOU LIKE INSTRUCTIONS?

yes

SOMEWHERE NEARBY IS COLOSSAL CAVE, WHERE OTHERS HAVE FOUND FORTUNES IN
TREASURE AND GOLD, THOUGH IT IS RUMORED THAT SOME WHO ENTER ARE NEVER
SEEN AGAIN.  MAGIC IS SAID TO WORK IN THE CAVE.  I WILL BE YOUR EYES
AND HANDS.  DIRECT ME WITH COMMANDS OF 1 OR 2 WORDS.  I SHOULD WARN
YOU THAT I LOOK AT ONLY THE FIRST FIVE LETTERS OF EACH WORD, SO YOU'LL
HAVE TO ENTER "NORTHEAST" AS "NE" TO DISTINGUISH IT FROM "NORTH".
(SHOULD YOU GET STUCK, TYPE "HELP" FOR SOME GENERAL HINTS.  FOR INFOR-
MATION ON HOW TO END YOUR ADVENTURE, ETC., TYPE "INFO".)

- - -
THIS PROGRAM WAS ORIGINALLY DEVELOPED BY WILLIE CROWTHER.  MOST OF THE
FEATURES OF THE CURRENT PROGRAM WERE ADDED BY DON WOODS (DON @ SU-AI).
CONTACT DON IF YOU HAVE ANY QUESTIONS, COMMENTS, ETC.

YOU ARE STANDING AT THE END OF A ROAD BEFORE A SMALL BRICK BUILDING.
AROUND YOU IS A FOREST.  A SMALL STREAM FLOWS OUT OF THE BUILDING AND
DOWN A GULLY.

east
YOU ARE INSIDE A BUILDING, A WELL HOUSE FOR A LARGE SPRING.

THERE ARE SOME KEYS ON THE GROUND HERE.

THERE IS A SHINY BRASS LAMP NEARBY.

THERE IS FOOD HERE.
```

Colossal Cave Adventure
First text-based role-playing game

1975: Highest-grossing Arcade Game



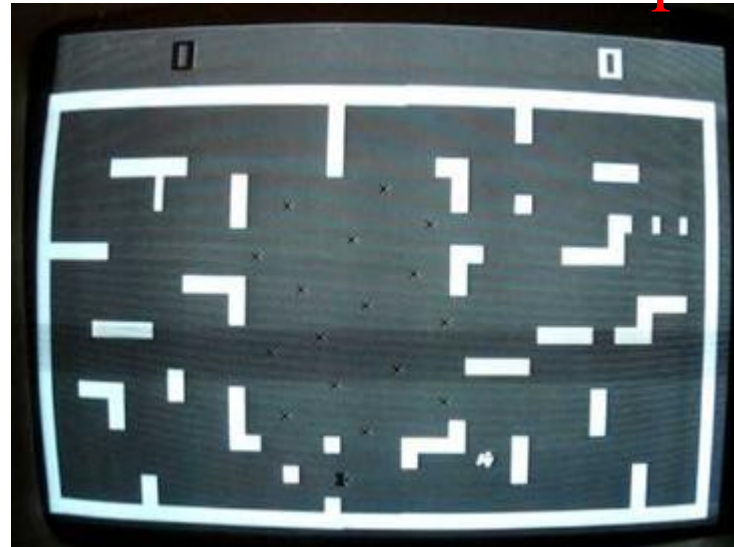
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Tank / Tank II

Kee Games (Atari)

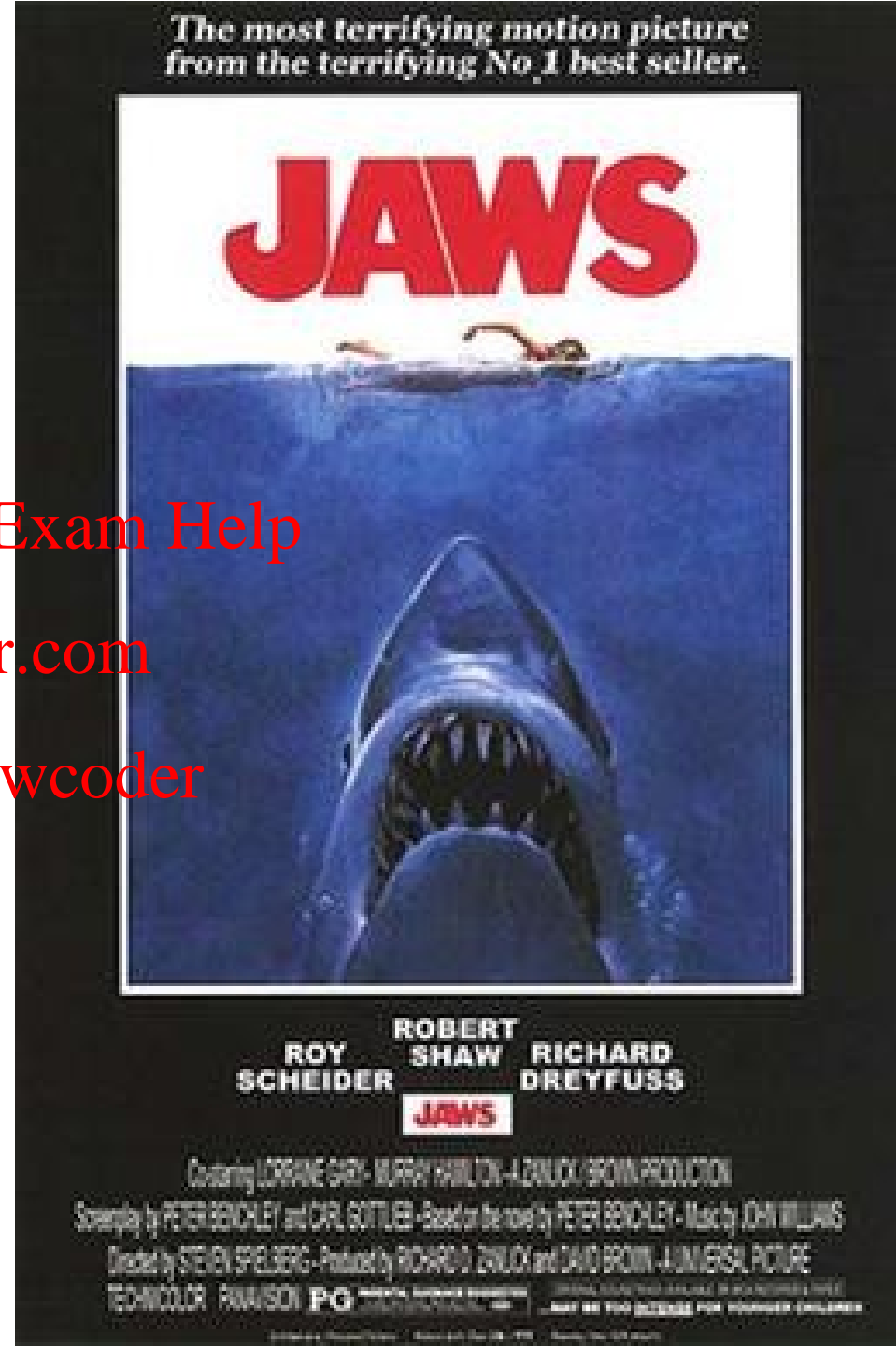


1975: Highest-Grossing Movie

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1975: Most Popular Song

Love will Keep us
Together
Captain and Tennille



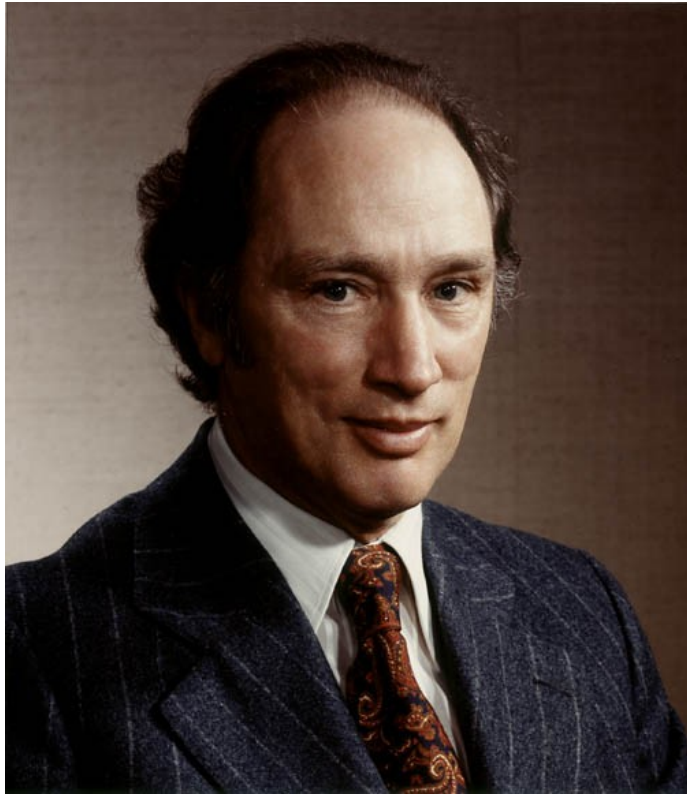
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1975

Canadian PM



Pierre Trudeau

US President



Gerald Ford

This TV show started



Saturday Night Live

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1975



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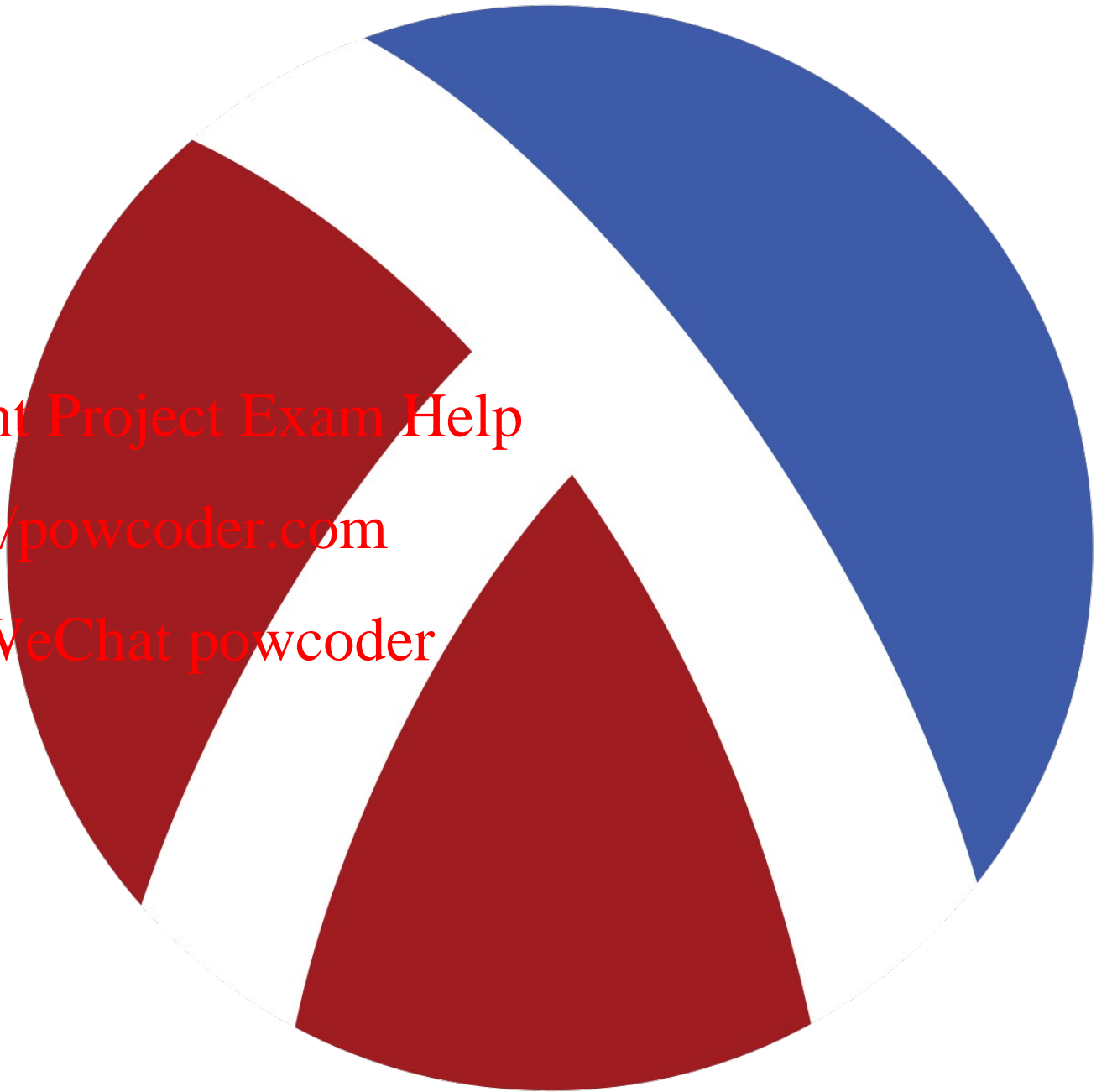
Milton the talking toaster
sold Pop Tarts

LISP	1958
Scheme	1975
Racket	~1995

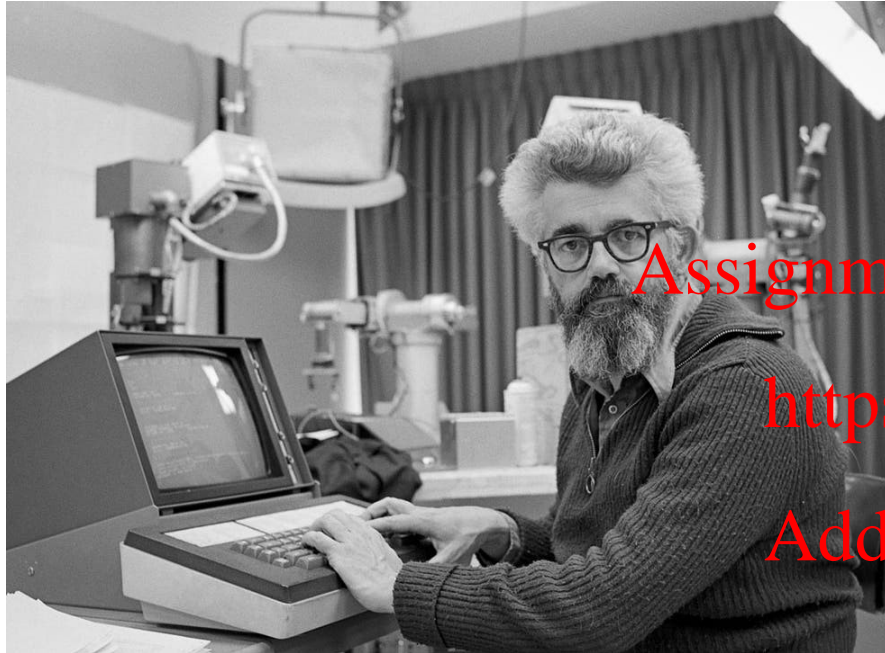
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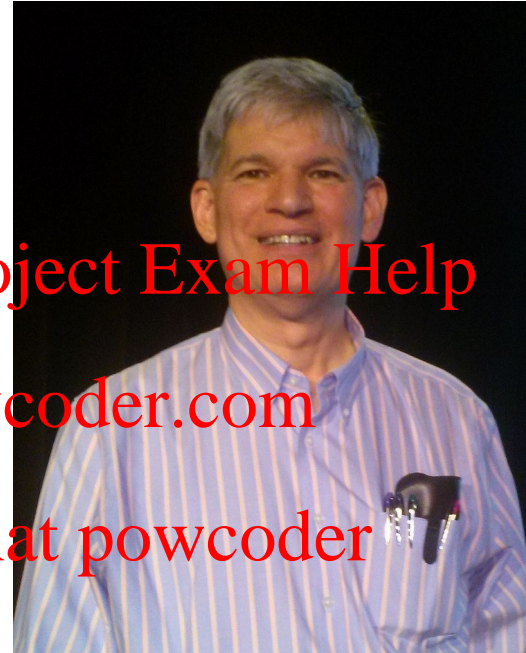


LISP and Scheme's Original Designers



John McCarthy (1927-2011)
Original designer of **LISP** (1958)

Also coined the term
Artificial Intelligence, and
for many years was a
leading AI researcher.



Guy Steele and Gerald Sussman
Original designers of Scheme (1975)

Racket is a modern
dialect of Scheme, with
many new ideas added.



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Scheme Probably **Can't** Get You a Job!

It's mostly a **research language** used by a subset of academic programming language researchers.

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A variant of LISP called **Clojure** has more recently gained some popularity for practical programming (but it's still pretty niche compared to other languages)

The original version of **JavaScript** was implemented as a Scheme-style language, before being modified to look more C-like.



Clojure

What's Scheme/LISP **Good** for?

Traditional **symbolic**
AI research.

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Inspiration: Packed with all
kinds of interesting ideas, many
of which have been used by
mainstream languages.

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**Writing programming
languages** and programming
language tools.

What's Scheme **Not** so Good For?

- Scheme is generally **not** as efficient as other languages.
 - Dynamically typed
 - Reliance on singly-lists as the core data structure
- Compared to the most popular mainstream languages, Scheme is **not** used much in practice, so it can be hard to find support for it.
- Scheme's notation is simple, but maybe too simple. **()-style notation** results in lots and lots of parentheses, which many programmers **dislike**.

Measuring the performance of different programming languages is surprisingly difficult to do fairly. Check out [the Computer Language Benchmarks Game](#)

Major Features of Scheme

Functions are first-class objects

Functions can be passed and returned (including closures)

Interpreted

Easy to evaluate individual expressions

Memory-safe and garbage-collected

No dangling pointers, no manual memory deletion

Homoiconic

Scheme programs are written as Scheme lists

Flexible

Powerful macro system allows for major changes to the language

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Major Features of Scheme

Types

Dynamically typed, i.e. types checked at run-time

Symbols

Singly-linked lists are

Continuations

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Lexical Scoping

One of the first languages to fully implement the lexical scoping rules we now take for granted

Tail Recursion

Tail-recursive functions are automatically optimized into loops

Major Features **Not** in Scheme

Features **not** part of Scheme

No type declarations

No pointers

No built-in notion of object-oriented programming

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Features We **Won't** Be Using

No loops

No mutation, e.g. no changing values of variables

Instead, we'll use **functional style**, which is what our next language (**Haskell**) will force us to use.

Hello, World!

```
;; hello world.rkt
```

```
(print "Hello,  
world!")
```

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Download and run this
in the **DrRacket** IDE.
We'll use both the
interpreter and file
editor in DrRacket.