

What's a protocol?

Human protocols:

- "what's the time?"
- "I have a question"
- introductions

... specific messages sent

... specific actions taken when message received, or other events

Network protocols:

- computers (devices) rather than humans
- all communication activity in Internet governed by protocols

Protocols define the format, order of messages sent and received among network entities, and actions taken on msg transmission, receipt



BNF Example

- All languages use integers
- The integer can be a single digit
- $\langle \text{integer} \rangle ::= \langle \text{digit} \rangle$
- This is read as an integer is defined ($::=$) to be a digit
- Now we define the digit
- $\langle \text{digit} \rangle ::= 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9$
- Anything that needs defining is put in $\langle \rangle$

$$\begin{aligned}
 \langle \text{assign} \rangle &\rightarrow \langle \text{id} \rangle = \langle \text{expr} \rangle \\
 \langle \text{id} \rangle &\rightarrow A \mid B \mid C \\
 \langle \text{expr} \rangle &\rightarrow \langle \text{expr} \rangle + \langle \text{term} \rangle \\
 &\quad \mid \langle \text{id} \rangle \\
 \langle \text{term} \rangle &\rightarrow \langle \text{term} \rangle * \langle \text{factor} \rangle \\
 &\quad \mid \langle \text{factor} \rangle \\
 \langle \text{factor} \rangle &\rightarrow (\langle \text{expr} \rangle) \\
 &\quad \mid \langle \text{id} \rangle
 \end{aligned}$$

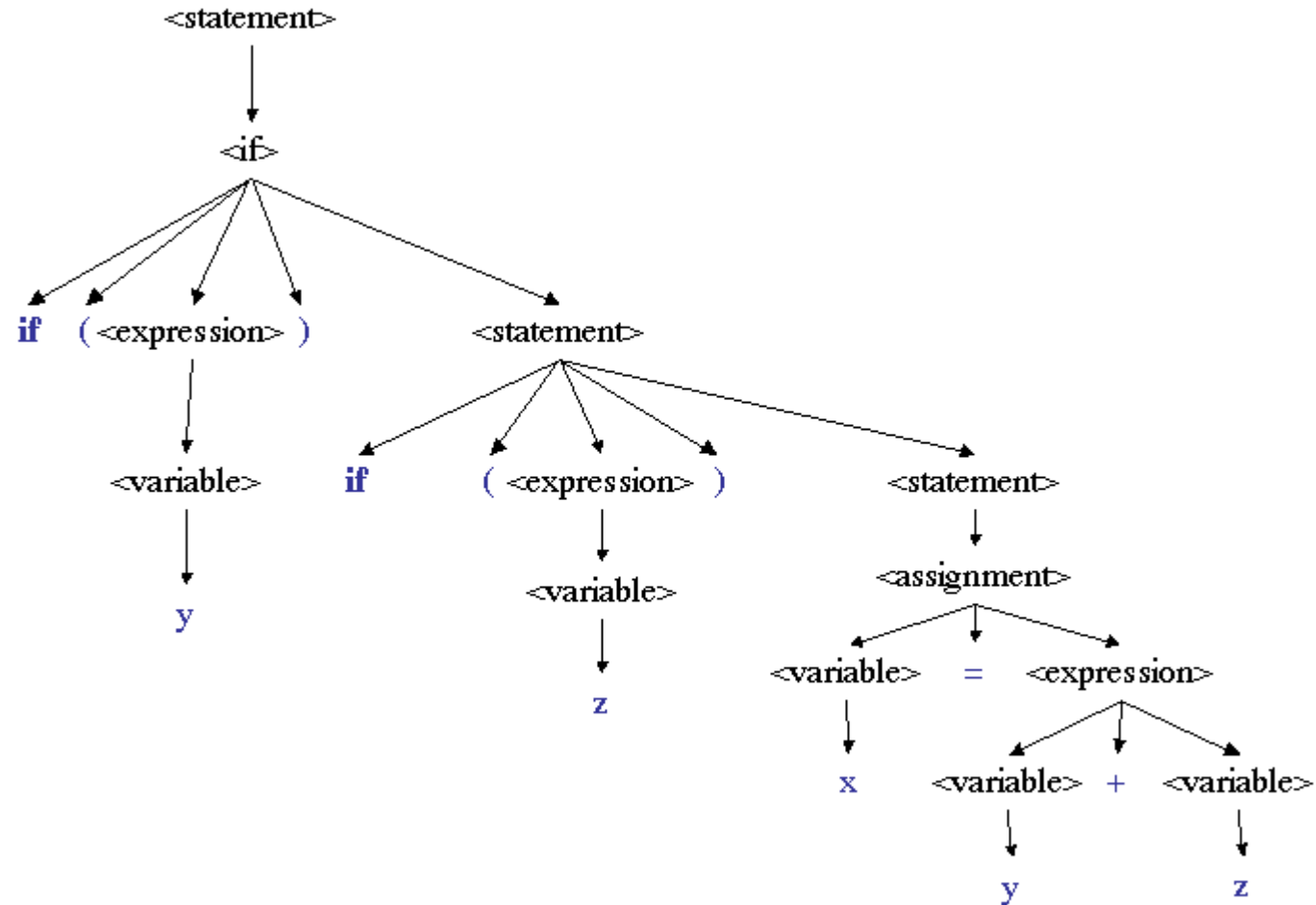
Statement1: $A=B+C*A$

Statement2: $A=B*C+A$

Statement3: $A=B+(C+A)$

Statement4: $A=B+(C*A)$

Statement5: $A=B*(C+A)$



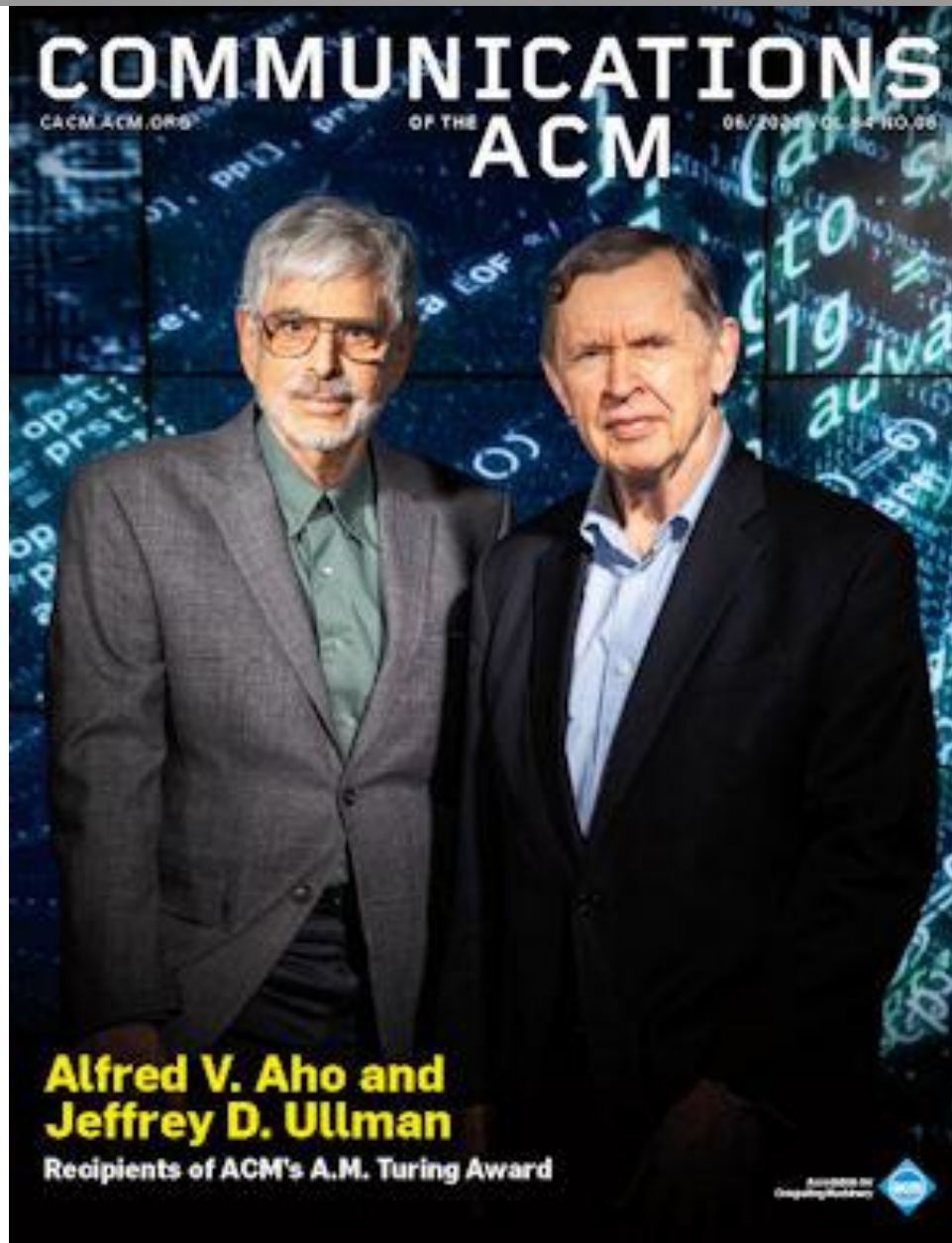
ALFRED AHO &
JEFFREY ULLMAN

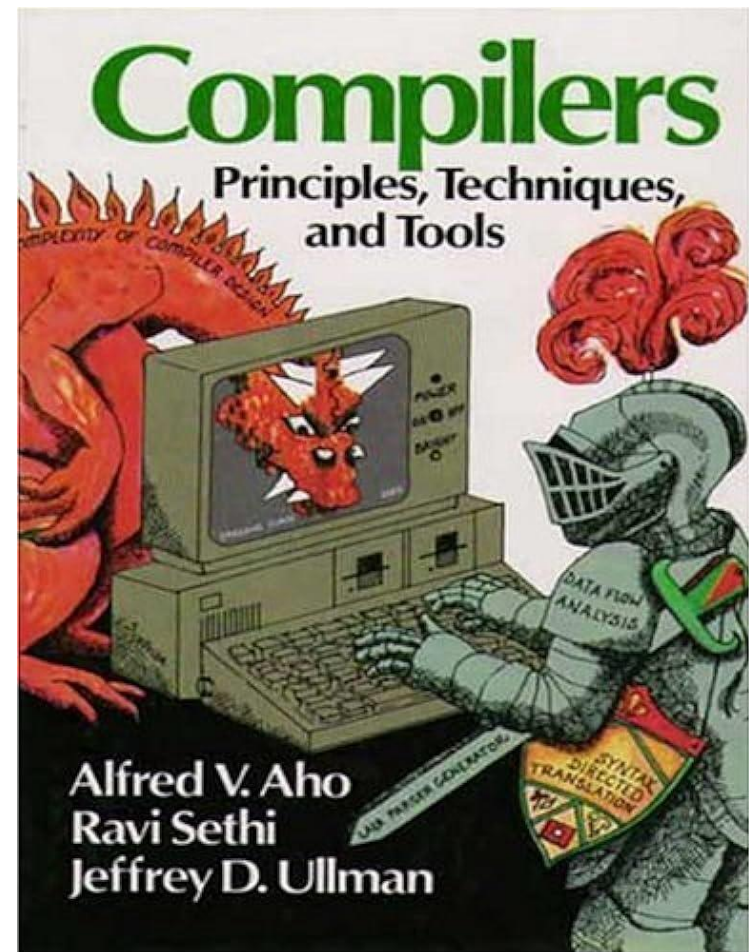
For fundamental algorithms and theory underlying
programming language implementation



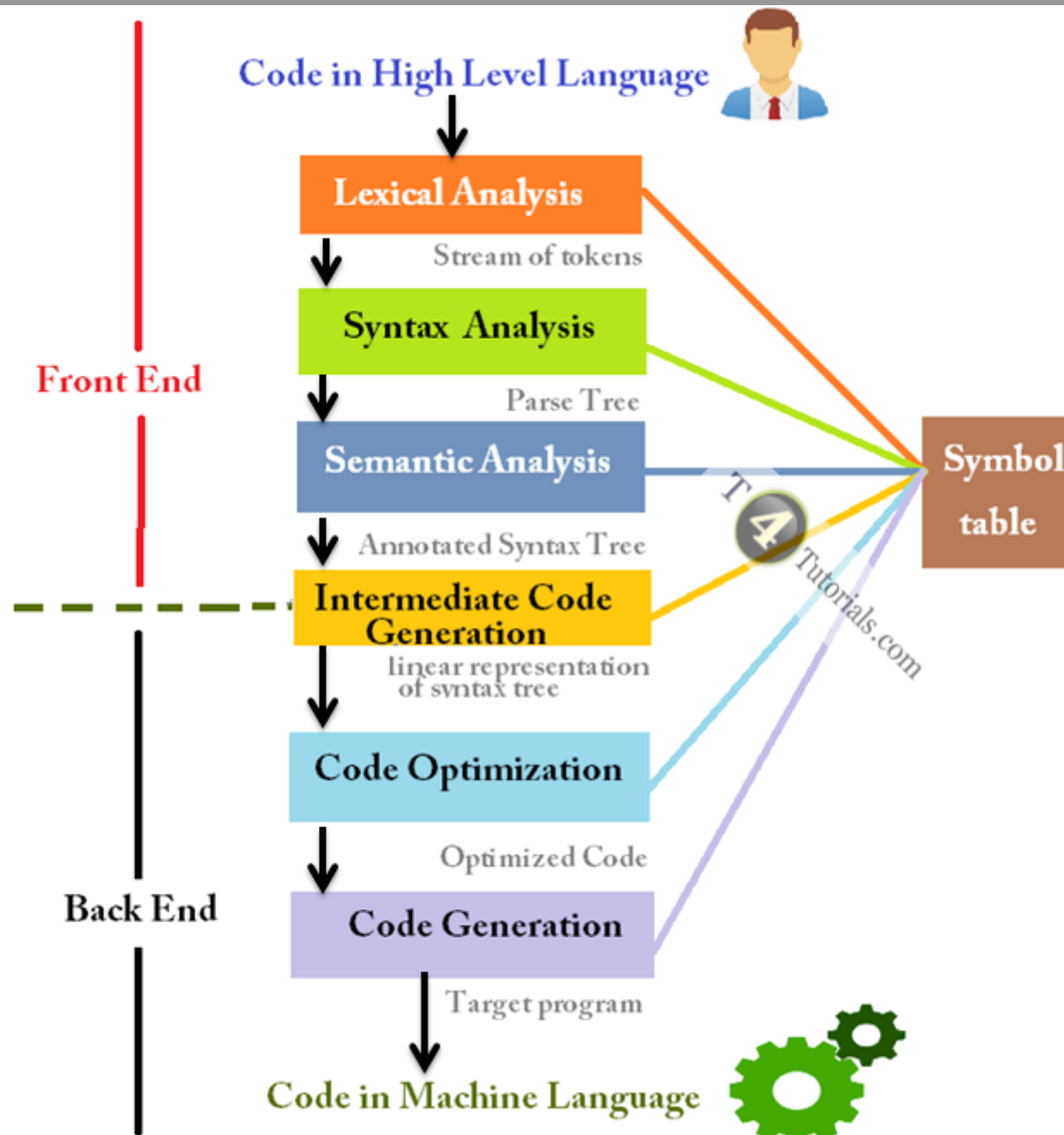
A.M.
TURING

A W A R D
2020









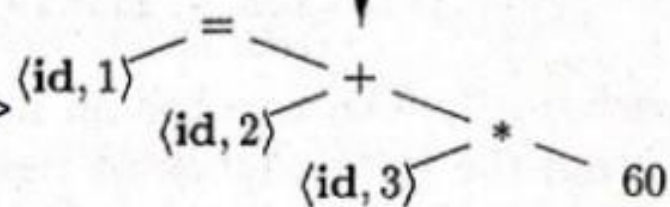
position = initial + rate * 60

Lexical Analyzer

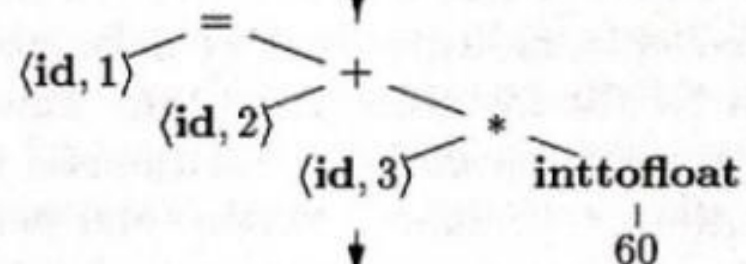
Stream of Token--><id, 1> <=> <id, 2> <+> <id, 3> <*> <60>

Syntax Analyzer

Parse Tree-->



Semantic Analyzer



Intermediate Code Generator

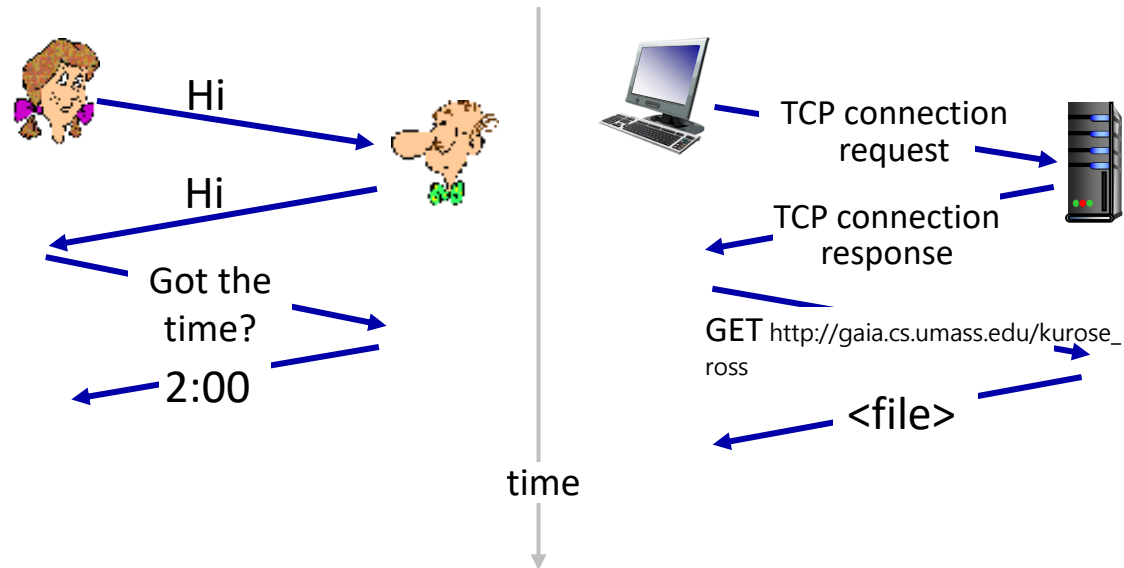
```
t1 = inttofloat(60)
t2 = id3 * t1
t3 = id2 + t2
id1 = t3
```

1	position	...
2	initial	...
3	rate	...

SYMBOL TABLE

What's a protocol?

A human protocol and a computer network protocol:



Q: other human protocols?

Chapter 1: roadmap

- ◆ What *is* the Internet?
- ◆ What *is* a protocol?
- ◆ **Network edge:** hosts, access network, physical media
- ◆ Network core: packet/circuit switching, internet structure
- ◆ Performance: loss, delay, throughput
- ◆ Security
- ◆ Protocol layers, service models
- ◆ History



Moore's Law

- “Moore's Law” states the number of transistors on a chip roughly doubles every two years
- “Moore's Law” states that transistor density on integrated circuits doubles about every two years.
- Moore's Law isn't a law at all
- Moore's prediction in 1965 popularly came to be known as “Moore's Law”
- It is a statement that microprocessor design is going to carry on improving at a steady rate



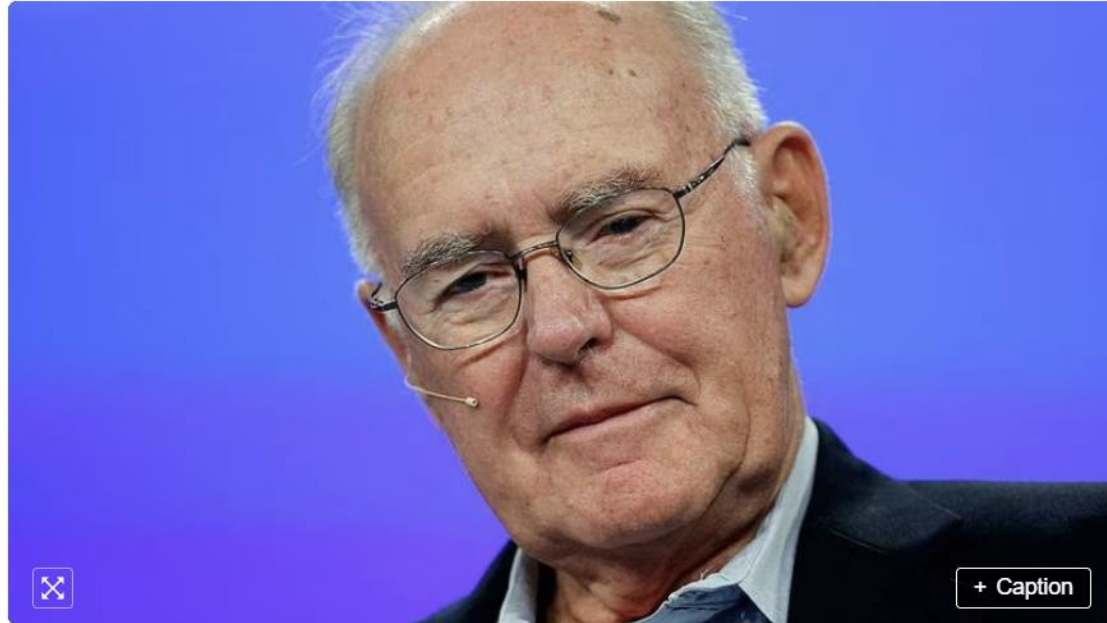
TRENDING

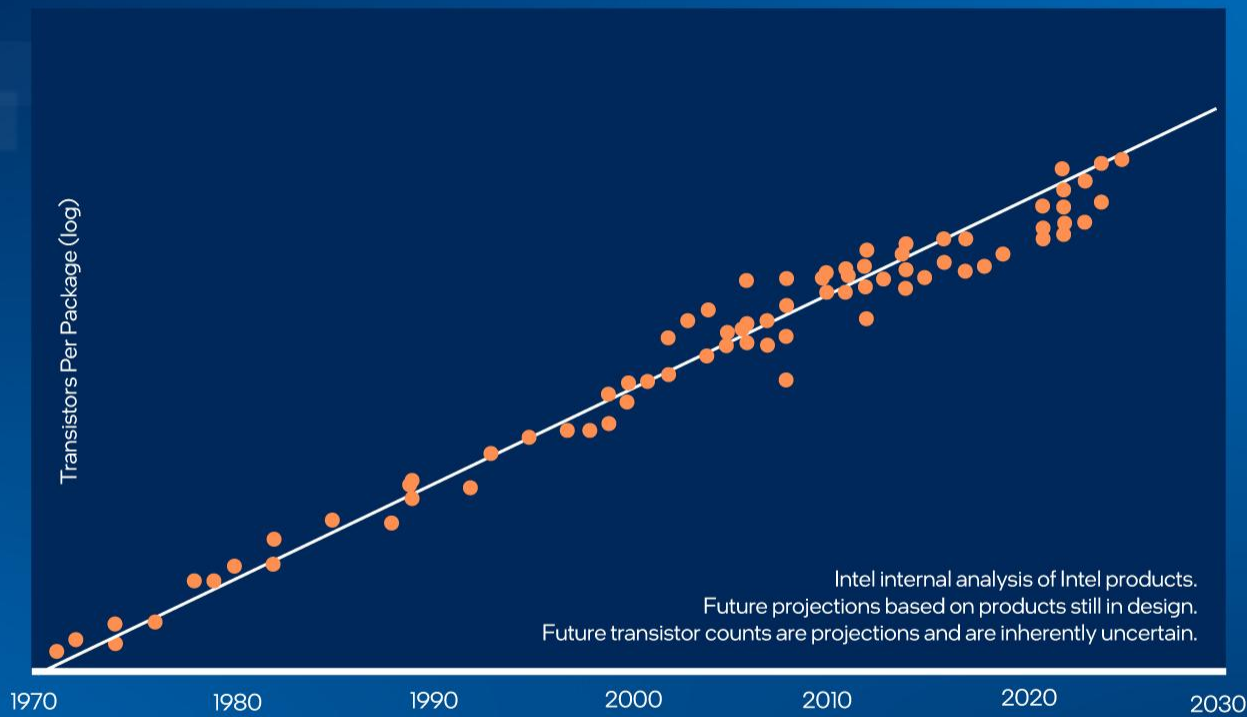
Intel co-founder Gordon Moore dead at 94



By Bob D'Angelo, Cox Media Group National Content Desk

March 25, 2023 at 7:37 am PDT

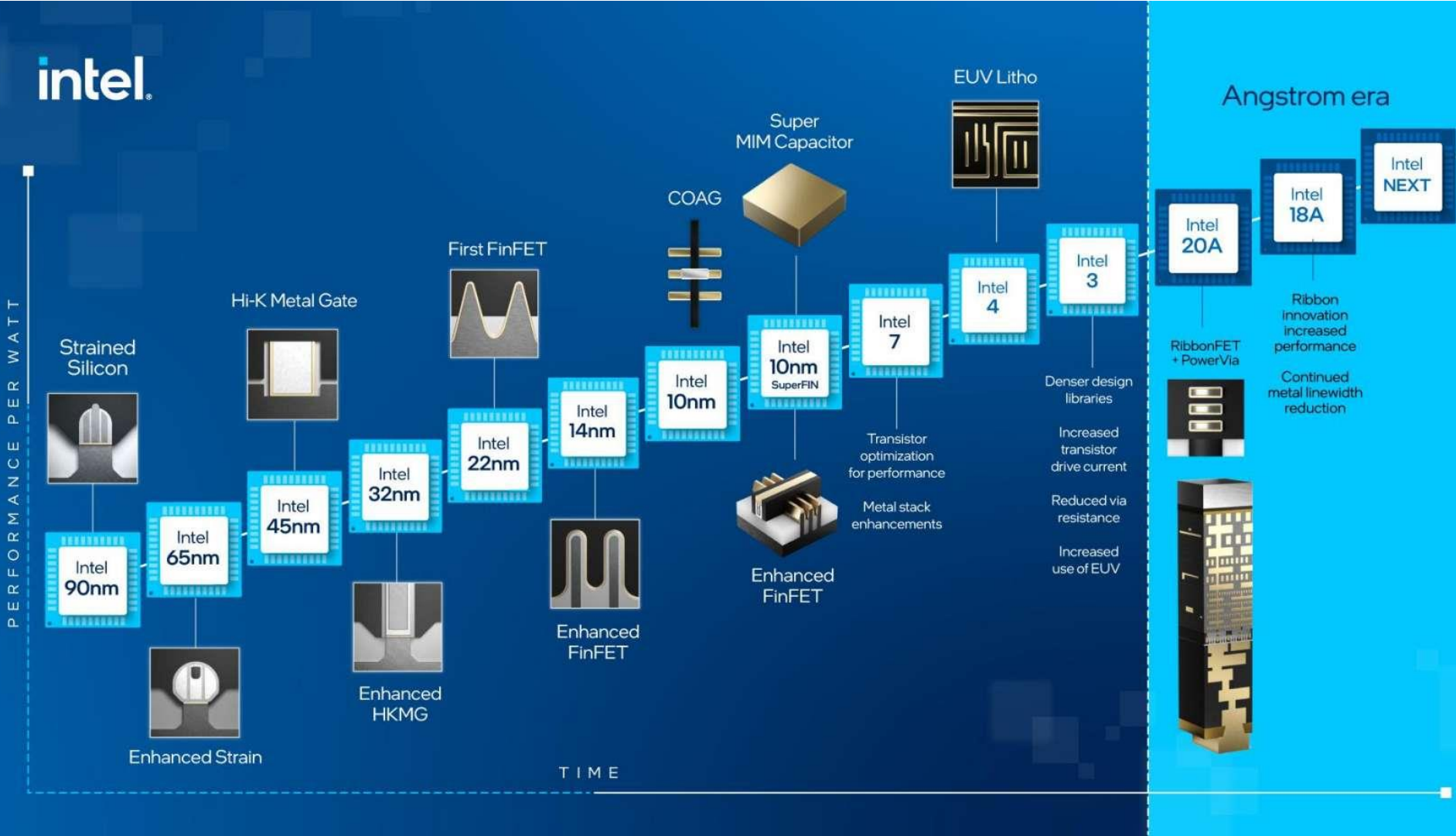


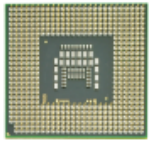


Aspiring to
1 Trillion
transistors in 2030

- ✓ RibbonFET
- ✓ PowerVia
- ✓ High NA
- ✓ 2.5D/3D packaging

intel.





CPU



GPU



TPU



NVIDIA®



Atmel®



NVIDIA®



BROADCOM®



Imagination

Google

Coral

HAILO

- ◆ Network protocol(s)
 - ◆ Syntax
 - ◆ Grammar
 - Regular grammar
 - Context-free grammar
 - ◆ Semantic (analysis)
 - ◆ Compiler
 - ◆ BNF
-
- ◆ Quiz 1 대비하세요!!