Module introduction, computers, and your first program

Computer Programming 143 – Lecture 1
Introduction to module

Faculty of Engineering

Lectures and Practicals II

Practicals and tests (compulsory)

- All programming must conform to guidelines – *C Programming Style Guide* (learn.sun.ac.za)
- Code handed in is tested for copying; copying / plagiarism is an offense for which you can be suspended from the university; you are responsible for the security of your code!
- Marks queries limited to within 7 days of publication

	Venue	**Group**
Tue	M2002, M004	Civil
11-13:00	Electronic classroom (Neelsie) E01.2	Chemical
	Jan Mouton (Electr. classr.) 2017	Mechatronic
	M003 (Neelsie) E01.2	Forestry
	M003	Mechanical
Tue	Jan Mouton (Electr. classr.) 2010	Afrikaans
14-16:00	M2004	Industrial (A-J)
	M2002	Industrial (K-Z)
	M3002	E&E, Data

Communication Channels

Communication channels

- **There will be no email correspondence**
- All questions must either be:
  - Posted on the appropriate forum
  - Communicated to the lecturers after lecture sessions or during practicals
- The course webpage and forums is available on stemlearn.sun.ac.za

Guidelines and Tips

Tips

- Workload: 9 hours per week
  - 3 h lectures
  - 2 h practical
  - 4 h self study
- Stay up to date
- Read the textbook
- Use the material on learn.sun.ac.za
- Ask if you are confused
- Program!

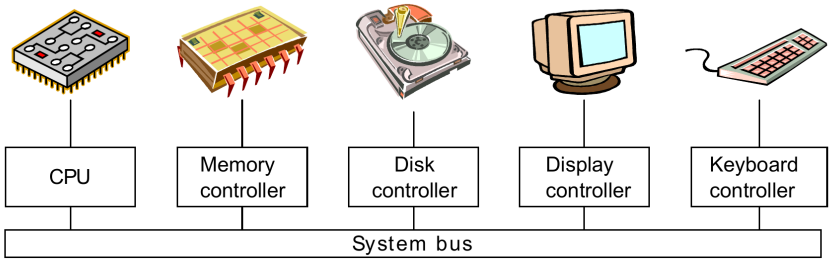
Computers and computer programming

Number of Operation.	Nature of Operation.	Variables acted upon.	Variables receiving results.	Indication of change in the value on any Variable.	Statement of Results.	Data. $^{1}V_{1}$	Data. $^{1}V_{2}$	Data. $^{1}V_{3}$	Working Variables. $^{0}V_{4}$	$^{0}V_{5}$	$^{0}V_{6}$	$^{0}V_{7}$	$^{0}V_{8}$	$^{0}V_{9}$	$^{0}V_{10}$	$^{0}V_{11}$	$^{0}V_{12}$	$^{0}V_{13}$	Result Variables. $^{1}V_{21}$ B₁	$^{1}V_{22}$ B₃	$^{1}V_{23}$ B₅	$^{0}V_{24}$... B₇
1	×	$^{1}V_{2} \times ^{1}V_{3}$	$^{1}V_{4}, ^{1}V_{5}, ^{1}V_{6}$	$\left\{\begin{matrix}{}^{1}V_{2}=^{1}V_{2}\\ {}^{1}V_{3}=^{1}V_{3}\end{matrix}\right\}$	$= 2n$	...	2	n	$2n$	$2n$	$2n$											
2	−	$^{1}V_{4} - ^{1}V_{1}$	$^{2}V_{6}$	$\left\{\begin{matrix}{}^{1}V_{4}=^{2}V_{4}\\ {}^{1}V_{1}=^{1}V_{1}\end{matrix}\right\}$	$= 2n-1$	1	...	...	$2n-1$													
3	+	$^{1}V_{3} + ^{1}V_{1}$	$^{2}V_{5}$	$\left\{\begin{matrix}{}^{1}V_{3}=^{2}V_{3}\\ {}^{1}V_{1}=^{1}V_{1}\end{matrix}\right\}$	$= 2n+1$	1	...	...	...	$2n+1$												
4	+	$^{2}V_{5} + ^{2}V_{4}$	$^{1}V_{11}$	$\left\{\begin{matrix}{}^{2}V_{5}=^{2}V_{5}\\ {}^{2}V_{4}=^{2}V_{4}\end{matrix}\right\}$	$\dfrac{2n-1}{2n+1}$	...	...	...	0	0	...	...	...	...	...	$\dfrac{2n-1}{2n+1}$						
5	+	$^{1}V_{11} + ^{1}V_{2}$	$^{2}V_{11}$	$\left\{\begin{matrix}{}^{1}V_{11}=^{2}V_{11}\\ {}^{1}V_{2}=^{1}V_{2}\end{matrix}\right\}$	$\dfrac{1}{2}\cdot\dfrac{2n-1}{2n+1}$	...	2	...	...	...	...	...	...	...	...	$\dfrac{1}{2}\cdot\dfrac{2n-1}{2n+1}$						
6	−	$^{2}V_{13} - ^{2}V_{11}$	$^{1}V_{12}$	$\left\{\begin{matrix}{}^{2}V_{13}=^{0}V_{13}\\ {}^{0}V_{13}=^{1}V_{12}\end{matrix}\right\}$	$= -\dfrac{1}{2}\cdot\dfrac{2n-1}{2n+1} = A_0$	...	...	...	...	...	...	...	...	...	...	0	.....	$-\dfrac{1}{2}\cdot\dfrac{2n-1}{2n+1} = A_0$				
7	−	$^{1}V_{3} - ^{1}V_{1}$	$^{1}V_{10}$	$\left\{\begin{matrix}{}^{1}V_{3}=^{1}V_{3}\\ {}^{1}V_{1}=^{1}V_{1}\end{matrix}\right\}$	$= n-1\ (=3)$	1	...	n	...	...	...	...	...	...	$n-1$							
8	+	$^{1}V_{2} + ^{0}V_{7}$	$^{2}V_{7}$	$\left\{\begin{matrix}{}^{1}V_{2}=^{1}V_{2}\\ {}^{0}V_{7}=^{1}V_{7}\end{matrix}\right\}$	$= 2+0 = 2$	...	2	...	...	...	...	2										
9	+	$^{1}V_{6} + ^{1}V_{6}$	$^{2}V_{11}$	$\left\{\begin{matrix}{}^{1}V_{6}=^{1}V_{6}\\ {}^{1}V_{6}=^{2}V_{6}\end{matrix}\right\}$	$\dfrac{2n}{2} = A_1$	...	...	...	...	...	$2n$	2	...	...	...	$\dfrac{2n}{2} = A_1$						
10	×	$^{2}V_{21} \times ^{2}V_{11}$	$^{1}V_{12}$	$\left\{\begin{matrix}{}^{2}V_{21}=^{2}V_{21}\\ {}^{2}V_{11}=^{2}V_{11}\end{matrix}\right\}$	$= B_1 \cdot \dfrac{2n}{2} = B_1 A_1$	...	...	...	...	...	...	...	...	...	...	$\dfrac{2n}{2} = A_1$	$B_1 \cdot \dfrac{2^6}{2} = B_1 A_1$	.....			B_1	
11	+	$^{1}V_{12} + ^{1}V_{13}$	$^{2}V_{13}$	$\left\{\begin{matrix}{}^{2}V_{21}=^{2}V_{21}\\ {}^{2}V_{13}=^{2}V_{13}\end{matrix}\right\}$	$= -\dfrac{1}{2}\cdot\dfrac{2n-1}{2n+1} + B_1 \cdot \dfrac{2n}{2}$	...	...	...	...	...	...	...	...	...	...	.....	0	$\left\{-\dfrac{1}{2}\cdot\dfrac{2n-1}{2n+1} + B_1\cdot\dfrac{2n}{2}\right\}$				
12	−	$^{1}V_{10} - ^{1}V_{1}$	$^{2}V_{10}$	$\left\{\begin{matrix}{}^{1}V_{10}=^{2}V_{10}\\ {}^{1}V_{1}=^{1}V_{1}\end{matrix}\right\}$	$= n-2\ (=2)$	1	...	...	...	...	...	...	...	...	$n-2$							
13	−	$^{1}V_{6} - ^{1}V_{1}$	$^{2}V_{6}$	$\left\{\begin{matrix}{}^{1}V_{6}=^{2}V_{6}\\ {}^{1}V_{1}=^{1}V_{1}\end{matrix}\right\}$	$= 2n-1$	1	...	...	...	...	$2n-1$											
14	+	$^{1}V_{1} + ^{1}V_{2}$	$^{2}V_{7}$	$\left\{\begin{matrix}{}^{1}V_{1}=^{1}V_{1}\\ {}^{1}V_{2}=^{2}V_{2}\end{matrix}\right\}$	$= 2+1 = 3$	1	...	...	...	...	...	3										
15	+	$^{2}V_{6} + ^{2}V_{7}$	$^{2}V_{8}$	$\left\{\begin{matrix}{}^{2}V_{6}=^{2}V_{6}\\ {}^{2}V_{7}=^{2}V_{7}\end{matrix}\right\}$	$= \dfrac{2n-1}{3}$	...	...	...	...	...	$2n-1$	3	$\dfrac{2n-1}{3}$									
16	×	$^{1}V_{8} \times ^{2}V_{11}$	$^{2}V_{11}$	$\left\{\begin{matrix}{}^{1}V_{8}=^{0}V_{8}\\ {}^{2}V_{11}=^{2}V_{11}\end{matrix}\right\}$	$= \dfrac{2n}{2}\cdot\dfrac{2n-1}{3}$	...	...	...	...	...	...	...	0	...	...	$\dfrac{2n}{2}\cdot\dfrac{2n-1}{3}$						
17	−	$^{2}V_{6} - ^{2}V_{1}$	$^{2}V_{6}$	$\left\{\begin{matrix}{}^{2}V_{6}=^{2}V_{6}\\ {}^{2}V_{1}=^{1}V_{1}\end{matrix}\right\}$	$= 2n-2$	1	...	...	...	...	$2n-2$											
18	+	$^{1}V_{1} + ^{2}V_{2}$	$^{2}V_{7}$	$\left\{\begin{matrix}{}^{1}V_{1}=^{1}V_{1}\\ {}^{2}V_{2}=^{2}V_{2}\end{matrix}\right\}$	$= 3+1 = 4$	1	...	...	...	...	...	4										
19	+	$^{2}V_{6} + ^{2}V_{7}$	$^{1}V_{9}$	$\left\{\begin{matrix}{}^{2}V_{6}=^{2}V_{6}\\ {}^{2}V_{7}=^{2}V_{7}\end{matrix}\right\}$	$= \dfrac{2n-2}{4}$	...	...	...	...	...	$2n-2$	4	...	$\dfrac{2n-2}{4}$	...	$\left\{\dfrac{2n}{2}\cdot\dfrac{2n-1}{3}\cdot\dfrac{2n-2}{3} = A_3\right\}$						
20	×	$^{2}V_{9} \times ^{2}V_{11}$	$^{2}V_{11}$	$\left\{\begin{matrix}{}^{2}V_{9}=^{2}V_{9}\\ {}^{2}V_{11}=^{2}V_{11}\end{matrix}\right\}$	$\dfrac{2n}{2}\cdot\dfrac{2n-1}{3}\cdot\dfrac{2n-2}{4} = A_3$	...	...	...	...	...	...	...	...	0								
21	×	$^{1}V_{22} \times ^{2}V_{11}$	$^{2}V_{12}$	$\left\{\begin{matrix}{}^{1}V_{22}=^{1}V_{22}\\ {}^{2}V_{12}=^{2}V_{12}\end{matrix}\right\}$	$= B_3 \cdot \dfrac{2n}{2}\cdot\dfrac{2n-1}{3}\cdot\dfrac{2n-2}{4} = B_3 A_3$	...	...	...	...	...	...	...	...	...	...	0	$B_3 A_3$	.....	.....	B_3		
22	+	$^{2}V_{12} + ^{2}V_{13}$	$^{2}V_{13}$	$\left\{\begin{matrix}{}^{2}V_{12}=^{0}V_{12}\\ {}^{2}V_{13}=^{2}V_{13}\end{matrix}\right\}$	$= A_0 + B_1 A_1 + B_3 A_3$	...	...	...	...	...	...	...	...	...	...	.....	0	$\left\{A_2 + B_1 A_1 + B_3 A_3\right\}$				
23	−	$^{2}V_{23} - ^{1}V_{1}$	$^{1}V_{10}$	$\left\{\begin{matrix}{}^{2}V_{23}=^{2}V_{23}\\ {}^{1}V_{1}=^{1}V_{1}\end{matrix}\right\}$	$= n-3\ (=1)$	1	...	...	...	...	...	...	...	...	$n-3$							

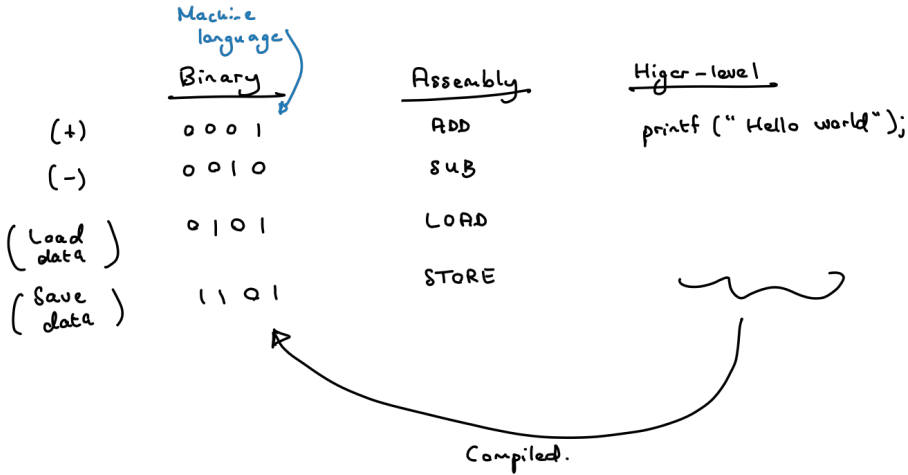
Here follows a repetition of Operations thirteen to twenty-three.

24	+	$^{1}V_{13} + ^{0}V_{24}$	$^{1}V_{24}$	$\left\{\begin{matrix}{}^{0}V_{13}=^{0}V_{13}\\ {}^{1}V_{24}=^{1}V_{24}\end{matrix}\right\}$	$= B_7$	...	...	...	...	...	...	...	...	...	...	.....	.....	.....	.....	.....	.....	B_7
25	+	$^{1}V_{1} + ^{1}V_{2}$	$^{1}V_{3}$	$\left\{\begin{matrix}{}^{1}V_{1}=^{1}V_{1}\\ {}^{1}V_{2}=^{1}V_{2}\end{matrix}\right\}$	$= n+1 = 4+1 = 5$	1	...	$n+1$	...	...	0	0										
				$\left\{\begin{matrix}{}^{1}V_{6}=^{0}V_{6}\\ {}^{1}V_{7}=^{0}V_{7}\end{matrix}\right\}$	by a Variable-card. by a Variable-card.																	

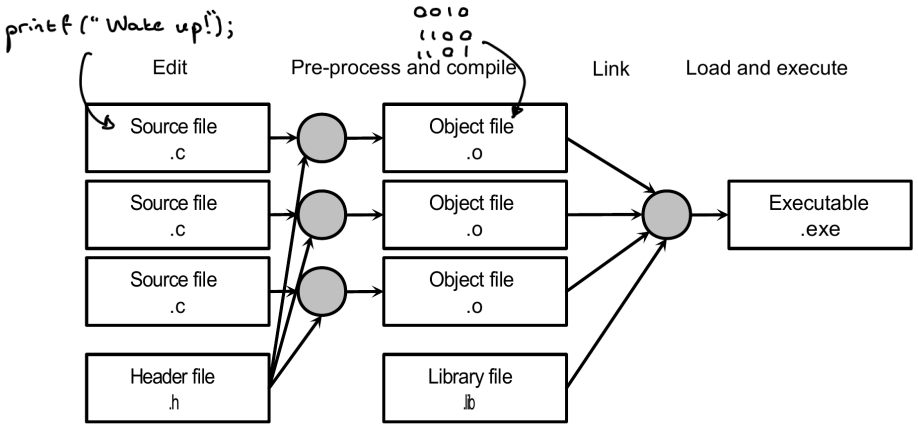
1.2.2 Computer Organization (Hardware) I



Machine, assembly and high-level languages



1.9 Typical C program development environment II



Why still learn to program if AI can do it?

✻ Cogitated for 29s

※ **recap:** *We've been building extra_notes.md in 2026/lectures/01_intro with historical and technical background for your course (Babbage, Lovelace, CPU internals). It's up to date with everything discussed; no pending action unless you want more topics added. (disable recaps in /config)*

❯ **Why still learn programming if AI can do it?**

● A few points worth making, especially since your students will ask this constantly:

- **You can't direct, debug, or evaluate what you can't understand.** AI-generated code still needs someone to specify the problem precisely, catch when the output is subtly wrong, and fix it when it breaks in production. Without programming fluency, you can't tell "confidently wrong" from "correct" — and LLMs produce confidently wrong code often enough that this matters.
- **Programming teaches a way of thinking, not just a skill for producing code.** Decomposing problems, reasoning about state and control flow, thinking in precise, unambiguous steps — that's transferable to engineering broadly, independent of who or what ends up typing the syntax.
- **The bottleneck is shifting, not disappearing.** Increasingly the valuable skill is reading code critically, specifying intent precisely, and verifying behavior — all of which *require* the same foundational understanding this course teaches. "Prompt it and hope" doesn't scale to real engineering problems with correctness or safety requirements.
- **Analogy worth using in class:** calculators didn't eliminate the need to learn arithmetic — you still need number sense to know when a calculator's answer is nonsense. Same relationship here, arguably with higher stakes since code failures can be more consequential than arithmetic slips.

If useful, I can draft this into a short section for your intro lecture (you've got that 2026/lectures/01_intro/ folder going already) — just say the word.

✻ Cogitated for 13s

❯ yes, add it to extra_notes.md

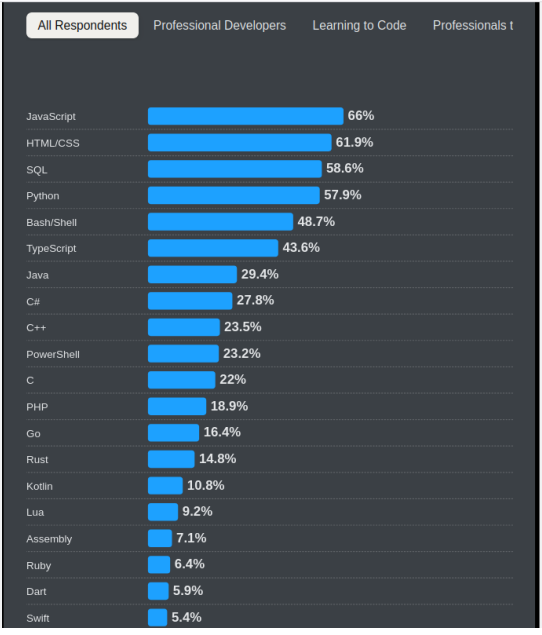
▸▸ accept edits on (shift+tab to cycle) · ← for agents

survey.stackoverflow.co/2025/technology#most-popular-technologies 120%

Programming, scripting, and markup languages

After more than a decade of steady growth, Python's adoption has accelerated significantly. It saw a 7 percentage point increase from 2024 to 2025; this speaks to its ability to be the go-to language for AI, data science, and back-end development.

Which **programming, scripting, and markup languages** have you done extensive development work in over the past year, and which do you want to work in over the next year? (If you both worked with the language and want to continue to do so, please check both boxes in that row.)



Homework

- Check lecture slides (including more homework)
- Install Code::Blocks (see STEMLearn)