|  | FIRST-GENERATION | SECOND GENERATION | THIRD GENERATION | FOURTH GENERATION |
| --- | --- | --- | --- | --- |
| Main Circuitry / Component / Technology | Vacuum Tubes | Transistors | Integrated Circuits | Microprocessors |
| **NOTE** | Data may vary based on what computer is used as the basis of the data. | | | |
| Summary of capabilities | * It is very sturdy and difficult to break. * Provided the growth for the future generations of computers. | * It is now portable but still heavy. * It become a commercial use. * It generates less heat than the first generation. * More reliable than the first generation. | * It is portable but not as heavy as the second generation. * It generates less heat than the second generation. * More reliable than the second generation. * Manual computation is not required * It can now compute much faster. | * Can now create a network of computer * The creation of personal computer * The use of data communication * Now has five independent units: Input, memory, arithmetic, control unit, and logic * Portable and cheap |
| Typical Transaction Speed | 78,000 additions or subtractions, 5,000 multiplications per minute, 3,700 divisions per minute, or 138,000 logical decisions per minute. | 229,000 additions or subtractions, 39,500 multiplications, or 32,700 divisions in one second. | execute 500,000 additions per second | execute 400,000,000 additions per second |
| Maximum Main Memory | 10,000 or 20,000 digits (1,000 or 2,000 words) | 32,768 of data. | 32-34 KB |  |
| I/O Capability | Cannot compute a very large amount of data and is sometimes inaccurate. | Can now compute a large amount of data and much more accurate | Can solve more than 1,000 problems involving about 200 billion calculations | Up to 16 GB |
| Function Summary: Data Processing | Can calculate in milliseconds. | Can calculate in microseconds. | could execute up to 16.6 million instructions per second. | could execute up to 16 billion instructions per second. |
| Function Summary: Data Storage | Very Low (no reliable data) | Much higher than first-generation (no reliable data) | could have up to 8 MB of main memory, | could have up to 16 MB of main memory, |
| Function Summary: Data Movement | Very slow (no reliable data) | Much faster than first-generation (no reliable data) | Up to 8 megabytes | Up to 8 gigabytes |
| Function Summary: Control | Very prone to error and frequent breaks. | Still prone to error but less frequent breaks. | Less prone to error and almost no breaks. | No error and breaks. |
| Language Used | Machine language | Assembly language and machine language | High-level language: FORTRAN, BASIC, COBOL | High-level language: C# C++, Java, Javascript, Kotlin, Python |
| Speed and Size | Very slow and very large in size - it can even take an entire room. | Much faster and smaller than first-generation | Smaller (almost similar to a desktop computer but still heavy), and faster than the second generation | Smaller (almost similar to a desktop computers but they are now more portable), and faster than the third generation |
| Memory | Magnetic drum and magnetic tape | Magnetic core and magnetic tape/disk | Large magnetic core, magnetic tape/disk | Semiconductor memory: RAM, ROM |
| Input/Output Device | Punched cards and paper tape. | Punched cards and magnetic tape | Magnetic tap, keyboard, monitor, printer, mouse, etc. | Keyboard, mouse, printer, monitor, etc. |
| Cons | * Consumes a lot of electricity and generates a lot of heat. * It needs air condition just to function properly. * Very limited storage * It needs constant maintenance. * It needs to be manually assembled. | * Still requires air-condition * Still requires frequent maintenance * High production and operational cost | * Still requires air-condition | * Highly complex and sophisticated |
| Examples | UNIVAC I, IBM 650, ABC, ENIAC, EDVAC | IBM 1620, CDC 1604, IBM 7090 | IBM 360, Honeywell 6000 series | Altair 8800, IBM PC, Apple II, Macintosh 128k |