Computer Architectures – Workshop 2

# Components of Your Mobile Phone

## Samsung Galaxy S7

* Processor: 2 CPU Clusters
  + 4x 1.59GHz ARM Cortex-A53
  + 4x 2.60GHz Exynos M1 (Mongoose)
* GPU: 2 GPUs
  + Exynos Mali-T880 MP12 – 12 Pipelines @ 650MHz
  + Snapdragon Adreno 530 – Cores running at 624MHz
* RAM: 4GB LPDDR4
* Storage: 32GB, 64GB, 128GB USF 2.0
* Connectivity Standards:
  + Up to 4G cellular data
  + Bluetooth allowing data to be sent and received wirelessly over short distances using radio waves.
  + NFC (Near-Field Communication). Data is sent or received between 2 devices that are within 4cm of each other.

# Moore’s Law

## Transistor per 1mm2 from 1983 - 1977

* 1983 – 1977 = 6
* (((10 000 \* 2)\*2)\*2) = 80 000 transistors into a 1mm2 area.

## Size of the transistors in 1967 compared to 1977

* 1977 – 1967 = 10
* 10 / 2 = 5
* Each transistor is 25 times bigger or 32 times bigger.

## Size of a single transistor in 1981

* 1981 – 1977 = 4
* 4/2 = 2
* 10 000 \* 22 = 40 000
* 1/40 000 = 0.000025mm2

## Prediction of transistor count in 2016

* 2016 – 1977 = 39
* 39 / 2 = 19.5 (Transistor count doubles 19 times)
* 10 000 \* 219 = 5 242 880 000 transistors per 1mm2
* Actual transistor count range between 3 000 000 000 and 7 000 000 000

# Number Systems

16653219 🡪 01110001

1+16+32+64=113

0111000012 = 11310

1910 = 100112

# Counting on Sirius

Caninary is base 4

|  |  |  |
| --- | --- | --- |
| Sirian | Caninary | Decimal |
| Doggy-one | 11 | 5 |
| Twoggy-two | 22 | 10 |
| Twoggy-one houndred and froggy | 2130 | 156 |
| Froggy-two | 32 | 14 |
| Two houndred and froggy | 230 | 44 |
|  | 10 | 4 |
|  | 21 | 9 |
|  | 102 | 18 |
|  | 3333 | 255 |

# Data Representation

|  |  |  |  |
| --- | --- | --- | --- |
| Prefix | Symbol | Numerical Value | Exponential Form (10n) |
| Peta | P | 1 000 000 000 000 000 | 1015 |
| Tera | T | 1 000 000 000 000 | 1012 |
| Giga | G | 1 000 000 000 | 109 |
| Mega | M | 1 000 000 | 106 |
| Kilo | K/k | 1 000 | 103 |
| - | - | 1 | 100 |
| Milli | m | 0.001 | 10-3 |
| Micro | µ | 0.000 001 | 10-6 |
| Nano | n | 0.000 000 001 | 10-9 |
| Pico | p | 0.000 000 000 001 | 10-12 |

First Number: 1910 = 000100112Second Number: 3210 = 001000002 = 111000002 Two’s complement

Binary addition: 00110011

Binary Subtraction: 11110011

Ascii character: Ã³ for 11110011

## 3210 or 001000002 in IEEE 754 floating-point format.