

## 3 Hardware 硬件

### 3.1 Computer and Its Components 计算机及其组件

#### **embedded system** 嵌入式系统

a computer system that only performs specific task built into another device. Its processor, memory and I/O capability are all dedicated to this task only.

#### **primary storage** 主存储器

also known as Immediate Access Storage (IAS). storage components directly addressable by the CPU, such as cache, RAM and ROM.

#### **secondary storage**

storage components not directly addressable by the CPU, such as HDD, SSD or optic disc.

#### **Random-Access Memory (RAM)** 随机存取存储器

volatile memory that can be read from or written to any number of times.

#### **static RAM (SRAM)** 静态 RAM

type of RAM chip that does not need refreshing. Each bit uses flip-flops consisting of several transistors. It's faster and consumes less power, but is more expensive.

### **dynamic RAM (DRAM) 动态 RAM**

type of RAM chip that needs to be constantly refreshed. Each bit uses a single transistor and capacitor. It's slower and consumes more power, but is less expensive.

### **memory cache 缓存**

high speed memory internal to the CPU chip but is external to processor storing data about to be needed by the processor.

### **read-only memory (ROM) 只读存储器**

non-volatile memory that cannot be written to but can be read from any number of times.

### **programmable ROM (PROM) 可编程只读存储器**

type of ROM that can be programmed once.

### **erasable PROM (EPROM) 可擦除可编程只读存储器**

can be programmed several times after erasing with UV light.

### **electrically EPROM (EEPROM) 电可擦除可编程只读存储器**

can be programmed many times after erasing with electrical signal. It stays in the circuit while changing content.

**buffer 缓冲区**

a temporary storage created for data transmitted from one part of the system to another which functions as a queue.

**Hard Disk Drive (HDD) 机械硬盘**

magnetic storage device that uses spinning disks.

**fragmentation 硬盘碎片**

data of the same file being stored on an HDD in non-consecutive sectors.

**Solid-State Drive (SSD) 固态硬盘**

storage device that has no moving parts and relies on the movement of electrons. Can be built from NAND gate or NOR gate.

**optical storage 光学存储**

types of storage device that uses laser light to read and write data, such as CD, DVD and Blu-Ray.

**liquid-crystal display (LCD) 液晶显示**

a screen back-lit by light-emitting diodes and with liquid crystal cells sandwiched between polarisers.

**resistive touch screen 电阻式触摸屏**

a flexible surface that causes contact between electrically resistive layers beneath when touched.

**capacitive touch screen 电容式触摸屏**

a rigid surface above a conductive layer that undergoes a change in electrical state when a finger touches the screen.

**sensor 传感器**

a hardware device that measures a property and transmits a value to a controlling computer.

**actuator 执行器**

a hardware device that receives a signal from a computer and adjusts the setting of a controlling device.

### **3.2 Logic Gates and Logic Circuits 逻辑门与逻辑电路**

**logic proposition 逻辑命题**

a statement that is either TRUE or FALSE.

**problem statement**

an informal definition of an outcome which is dependent on one logic proposition or a combination of two or more logic propositions.

**logic expression 逻辑表达式**

logic propositions combined using Boolean operators, which may be equated to a defined outcome.

**logic gate 逻辑门**

a component of a logic circuit that has an operation matching that of a Boolean operator.

**truth table 真值表**

a method of checking the output from a logic circuit. They use all the  $2^n$  possible combinations from  $n$  binary inputs.