QUESTION 1

CONTRAST BETWEEN HARVARD AND VON NEUMANN ARCHITECTURES

Harvard Architecture	Von Neumann Architecture
Separate memories for instructions and data	Single memory for instructions and data
Instructions and data have different address spaces	Instructions and data share the same address space
Instruction and data fetching can occur simultaneously	Instruction and data fetching must occur sequentially
Can achieve higher throughput with dedicated instruction and data buses	Limited by shared instruction and data bus
Typically used in embedded systems and digital signal processors	Typically used in general-purpose computers
More complex to design and program	Simpler to design and program
Provides higher security by preventing certain types of attacks	More vulnerable to attacks such as buffer overflow

SIMILARITIES

Harvard Architecture	**Von Neumann Architecture**
Both are computer architectures	Both have a central processing unit (CPU)
Both can execute programs and perform computations	Both have a memory unit that stores data and instructions
Both use binary logic and arithmetic operations	Both use input/output devices for communication with external devices

Harvard Architecture	Von Neumann Architecture
Both have control units that manage the flow of data and instructions	Both have arithmetic and logic units that perform arithmetic and logical operations
Both are widely used in modern computer systems	Both have been used in a wide range of computing applications over the years

Example are:

Harvard Architecture:

- Digital signal processors (DSPs)
- Microcontrollers used in embedded systems
- Some types of network processors

Von Neumann Architecture:

- Personal computers
- Servers and mainframe computers
- Most general-purpose processors and microcontrollers
- Mobile phones and tablets

QUESTION 2

CONTRAST BETWEEN CISC AND RISC

CISC Architecture	RISC Architecture
Complex and multi-functional instruction set	Simple and limited instruction set
Emphasizes hardware over software	Emphasizes software over hardware
Uses microcode to translate complex instructions into simpler ones	Does not use microcode
Generally slower clock speeds due to complexity	Generally faster clock speeds due to simplicity
More memory-intensive due to larger instructions	Less memory-intensive due to smaller instructions

CISC Architecture	**RISC Architecture**
Typically used in desktop computers, mainframes, and high-end servers	Typically used in embedded systems, smartphones, and other mobile devices

COMPARE AND CONTRAST BETWEEN CISC AND RISC

CISC Architecture	RISC Architecture
Emphasizes hardware over software	Emphasizes software over hardware
Large and complex instruction set	Small and simple instruction set
Instructions can perform multiple operations	Instructions are designed to execute a single operation
Uses microcode to translate complex instructions into simpler ones	Does not use microcode
Generally slower clock speeds due to complexity	Generally faster clock speeds due to simplicity
More memory-intensive due to larger instructions	Less memory-intensive due to smaller instructions
Uses variable-length instruction format	Uses fixed-length instruction format
Often used in desktop computers, mainframes, and high-end servers	Often used in embedded systems, smartphones, and other mobile devices

Example are:

CISC Architecture:

- Intel x86 processors, such as the Pentium and Core series
- AMD processors, such as the Athlon and Ryzen series
- Motorola 68k processors, which were used in early Apple Macintosh computers

RISC Architecture:

- ARM processors, which are used in most smartphones and tablets
- MIPS processors, which are used in some routers and embedded systems
- PowerPC processors, which were used in early Apple Macintosh computers and some game consoles, such as the Nintendo GameCube