Chapter 4

Exception Processing

Objectives
- The three processing states: normal, halted, and exception
- The differences between user and supervisor states
- Methods used to change the privilege state
- Exception processing procedures
- The vector address table
- Multiple exceptions and exception priorities
- Special exceptions such as reset, bus and address error, and trace
- The general requirements of all exception handlers

Introduction
- Exception handler – to handle catastrophic system faults, external and internal interrupts, and other events
- Some for frequently occurred issues, while others may defined by programmers

Execution States
- 68000 always functions in one of three states: normal, halted, or exception
- Normal – 68000 executing instructions
- Halted – not executing any instructions, due to some catastrophic system failure
- Exception – 68000 handles all exceptions

Privilege States
- Two privilege states: user and supervisor
- A privileged instruction may execute only in the supervisor state

Changing the Privilege State
- All exception processing takes place in the supervisor state
- Only way from user state to supervisor state is for an exception to occur
- For supervisor state to user state – RTE instruction or load the SR with a new set of status bits or use AND and EOR to modify bits
Exception Processing
- Step 1: adjust status register
- Step 2: get vector number
- Step 3: save processor information
- Step 4: fetch new program counter

Multiple Exceptions
- If you were on a street corner and noticed that, simultaneously, from one direction a runaway car was heading directly for you and from the other direction a big dog was also running toward you, what would you do?

Special Exceptions
- Reset
- Bus error
- Address error
- Trace
- Interrupt
- Illegal instructions
- Unimplemented instructions
- Privilege violation
- TRAP
- TRAPV
- CHK
- Divide-by-zero

Exception Handlers
- The exception handler is the actual section of code that takes care of processing a specific exception when it is encountered

Troubleshooting Skills
- All exception is in supervisor state

Summary