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**Accounting Information
Systems**

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A.I.S. Class 27: Outline

- Group Work for Chapter 5
- Learning Objectives for Chapter 11
- Information Systems Auditing
- Group Work for Chapter 11
- Hardware Performance
- Group Evaluation Forms

Group Work for Chapter 5

- Discussion Questions
- Problems 1 & 3

Learning Objectives for Chapter 11

- After studying this chapter you should be able to:
 - * describe the types of audits and auditors
 - * provide an overview of the audit process for financial statement audits
 - * describe the effects of computerization on the accounting process
 - * briefly describe the audit process for financial statement audits
 - * describe the essence and issues concerning the impact of SAS No. 55 on computer auditing

Learning Objectives for Chapter 11

- After studying this chapter you should be able to:
 - * describe various computer auditing techniques and how they could be applied in database environments
 - * distinguish between auditing around, auditing with and auditing through the computer
 - * explain the process of auditing a relational DBMS
 - * describe the implications of information technology on computer auditing

Information Systems Auditing

- **Types of Audits**
 - * **External Audits**
 - * **Internal Audits**
 - Operation of Internal Controls
 - Management or Operational
 - * **Compliance Audits**

Information Systems Auditing

■ **Audit Steps**

- * **Establish Audit Objectives**
- * **Perform Audit Procedures**
- * **Evaluate Audit Evidence**
- * **Develop an Audit Opinion**
- * **Communicate Audit Results**

Information Systems Auditing

- Auditing is the subject of another course
- We focus in this class only on how auditing is affected by the implementation of computerized accounting information systems

Information Systems Auditing

- **Effects of Computerization**
 - * **Decreased processing visibility**
 - * **Data only in computer-readable form**
 - * **Loss of visible audit trail**
 - * **Extreme consequence of program errors**
 - * **Lack of common sense**
 - * **Increase in value of average fraud losses**

Information Systems Auditing

- **Offsetting benefits**
 - * **Improved prevention**
 - * **Electronic audit trail**
 - * **Computer-assisted audit techniques**

Information Systems Auditing

- **SAS 48**
 - * **The auditor must assess**
 - the extent of computerization of accounting
 - the complexity of computer-based systems
 - the degree to which audit evidence is in computer-readable form only
 - * **and identify**
 - computer-based controls

Information Systems Auditing

- SAS 55 (as amended by SAS 78 & 94)
 - * Internal Control Structure
 - * $AR = IR \times CR \times DR$
 - AR: Audit Risk
 - IR: Inherent Risk
 - CR: Control Risk
 - DR: Detection Risk
 - * AR (Set by audit firm) = $IR \times CR (\uparrow) \times DR (\downarrow)$
 - * Document understanding of internal control structure
 - * Assess control risk (and test controls)
 - * Amend substantive procedures accordingly

Information Systems Auditing

- Sarbanes-Oxley Act 2002 s.404
 - * **Distinguish**
 - Internal controls over transaction processing
 - Internal controls over financial reporting
 - * **For public companies, with respect to internal controls over financial reporting**
 - Management must now review, document and test
 - Management must issue a report on their work
 - External auditor must test management's work
 - Auditor issues a separate report on internal controls over financial reporting
 - Any major weakness requires an adverse report on internal controls

Information Systems Auditing

■ Auditing Standard 5

- * The auditor must perform additional audit procedures to ascertain whether there are material weaknesses in internal control
 - If there is a material weakness, an adverse opinion on internal controls will be issued
 - Otherwise, an unqualified opinion will be issued on internal controls.
- * The external auditor is also required to issue an opinion on management's philosophy regarding internal controls over financial reporting
- * Auditors must perform a walkthrough of the accounting systems in order to understand how accounting transactions flow through the system
 - How the computer-based accounting system processes accounting transactions, from initiation of the transaction to eventual reporting in the financial statements
- * Automated controls are associated with lower risk than non-automated (manual) controls
- * Automated controls work consistently from year to year, assuming that the control itself has not changed and that general controls over program changes are effective and tested periodically.
- * The auditor's testing of information technology controls might focus on the application controls built into the pre-packaged software that management relies on to achieve its control objectives and the IT general controls that are important to the effective operation of those application controls

Information Systems Auditing

- Audit approaches and Computer Audit
 - * Auditing around the computer
 - * Auditing through the computer
 - Test data
 - Integrated Test Facility (ITF)
 - Embedded Audit Module
 - Mapping
 - Source code comparison
 - Parallel simulation
 - Reprocessing
 - * Auditing with the computer

Information Systems Auditing

- Auditing with the computer
 - * Utility programs
 - * DQL (e.g., QBE in ACCESS)
 - * Generalized Audit Software (e.g., IDEA, ACL)
 - Data retrieval
 - Calculations
 - Edit checks
 - Reformatting
 - File operations
 - Statistical sampling
 - Reports – “exception reports”

Information Systems Auditing

- **Advanced Technology Environments**
 - * **Concurrent auditing**
 - **Continuous auditing**
 - * **Expert systems**
 - * **Audit program generators**
 - * **Audit workpapers**
 - * **PC-based reference software**

Group Work for Chapter 11

- Discussion Questions
- Problems 6 & 7

Hardware Performance

- Chapter 3 addresses Hardware and Software Technology
- A key idea discussed there is the *internal bus* or *system bus*
- This is a communication channel, or data path, that connects the CPU and the memory unit
- The Central Processing UNIT (CPU) has three main parts
 - * Arithmetic-logic unit (ALU) – does the actual computation
 - * Control unit (synchronized to the internal clock)
 - * Registers
 - A *register* is a high-speed memory location inside the CPU

Hardware Performance

- The system bus has three main parts
 - * Data bus – transmits data
 - * Address bus – transmits addresses of memory locations
 - * Control bus – transmits control signals (e.g., read, write, etc.)
- Each memory location is identified by its *address*
- Addresses are numbers: 0, 1, 2, 3, etc.
- Each bus is characterized by its *width*
- Think of this as the number of parallel wires in the path
- This is the number of separate bits that can be transmitted at once

Hardware Performance

- The original IBM PC had an 8088 processor that had a 20 bit address bus and an 8 bit data bus
- Thus, the data bus could transmit 8 bits simultaneously
- i.e., 1 byte of data could be moved from RAM to the CPU or from the CPU to RAM in a single move
- i.e., to move a standard 32 bit floating point (real) number (e.g., 3.14159) would take 4 moves of 8 bits!
- Typically, registers are designed to store as much data as can be transmitted on the data bus at one time
- Originally, the 8086 chip was designed with a 16 bit data bus and 16 bit registers – but the 8088, a “reduced” version of the 8086 used for the IBM PC, had only an 8 bit data bus

Hardware Performance

- The original IBM PC had an 8088 processor that had a 20 bit address bus and an 8 bit data bus
- Thus, the address bus could transmit 20 bits simultaneously
- i.e., addresses up to $2^{20} = 1,048,576$ could be used
- i.e., up to 1MB of RAM could be addressed!
- (Due to a limitation in the Microsoft operating system, DOS, only 640 KB could actually be used)
- Memory is limited by:
 - * The number of available addresses, based on the address bus
 - * The number of memory locations on the memory chips fitted
 - IBM PC had from 16KB to 256KB

Hardware Performance

- Every CPU has a set of instructions that its ALU is able to interpret and execute
- Typically, the CPU can operate on numbers the size of its registers (the “word” size)
- Thus, the 8088 could directly add two 16 bit numbers
- In general, instructions sets have become larger and added new, more complex, instructions
 - * For example, the 8088 included a Multiply instruction, so that the 8088 could directly multiply two 16 bit numbers
 - Prior CPUs, such as the Z80, could only do this by repeated addition
 - * More complex instructions themselves may be longer
 - * More complex instructions may take longer (i.e., more clock cycles) to execute

Hardware Performance

■ Fetch-execute cycle

- * **The CPU, systems bus, and RAM cooperate as follows**
 - One register (PC) is used to store the address of the next instruction to be executed
 - That address is placed on the address bus
 - A 'read' signal is placed on the control bus
 - The instruction at that address in memory is transferred to the CPU
 - The data (instruction) is placed on the data bus
 - The data is transferred to the CPU
 - If the instruction is larger than the width of the address bus, this may take multiple moves
 - The instruction is interpreted and the address of the first data item it references is placed on the address bus
 - A 'read' signal is placed on the control bus
 - The data at that address in memory is transferred to a register in the CPU via the data bus
 - The address of the second data item referenced in the instruction is placed on the address bus
 - A 'read' signal is placed on the control bus
 - The data at that address in memory is transferred to a register in the CPU via the data bus
 - The CPU executes the instruction and retains the result in a register
 - The address in RAM where the result is to be stored is placed on the address bus
 - A 'write' signal is placed on the control bus
 - The data is transferred to the address in memory via the data bus
 - The PC register is updated to point to the next instruction to be executed

Hardware Performance

- A contemporary Pentium 4 is much more powerful than the original IBM PC
 - * More complex instruction set
 - But average instruction takes more CPU cycles
 - * 32 bit registers
 - * 32 bit data bus can move 4 bytes at once
 - Took 4 cycles on 8088
 - * 32 bit address bus allows up to 2^{32} memory locations = 4,294,967,296 = 4GB
 - Of course, you may not have bought that much RAM!
 - * Finally, much faster clock speed (3.8 GHz v. 4.77MHz)

Hardware Performance

- Thus, performance and throughput of a PC are determined not just by processor speed, but by:
 - * Complexity of instruction set
 - * Average time (cycles) for instructions
 - * Register size
 - * Data bus width
 - * Address bus width
 - * Bus speed
 - * Memory installed
 - * Dual processors
 - * Ram 'speed' – latency – e.g., time to store data in location once it is reached

- * Then there is the actual software itself, speeds of external devices, etc.

Ash Accounting

- Stage 7 – Due December 9
 - * Produce Final Report on the project as described in the original assignment note
 - * Remove Stage 6 printed materials only – leaving Stages 1–4, 7
 - * For Stage 7, print & file Final Report as above, together with revised/corrected versions of final reports (but NOT the ACCESS documentation)
 - Human Resource Management
 - WIP
 - Payroll Register
 - Checks
 - Purchases
 - Payment Checks
 - Analysis of Expenses by type – showing dollar value and percentage of total
 - Fixed Assets
 - Checks
 - Fixed Assets Note
 - All
 - Financial statement numbers! . . .
 - * Ensure payroll, depreciation etc. calculations work!
 - * Submit two databases via Digital Dropbox using previous naming conventions

Group Evaluation Forms

- Group Project Evaluation forms are due in class December 9 and are **MANDATORY**
- You cannot get credit for the Group Project without completing and submitting this form!
- Evaluations will be held confidential
- You will find that peer evaluations are a feature of professional life – treat them with seriousness, honesty and respect

Finally . . .

- Classes on Wednesday December 9 will be held in Levin Lab 005
- Please download, print, and bring to class the document "SAP R/3 Information Session" you will find on Blackboard at Course Documents: Resources