5.1 Introduction

The speed of automation of all activities, whether they be connected to business directly or not has surprised the stakeholders of enterprises, who are affected by such computerization. In our professional work, we realize that our daily jobs have been changed with the help of technology and automated systems. For example-Attendance marking and Tracking systems. Any enterprise located in any remote corner can make their products or services available to anyone, anywhere at any time. New technologies are getting developed due to large scale computerization, decreasing costs of storing data and increasing speed of internet. Emerging technologies such as virtualization, grid computing and cloud delivery model are enabling technology. However, the level of automation needs to be controlled considering the inherent risks of technology.

5.2 Business Applications

Business Application is defined as a computer program used to fulfill a person’s need for regular occupation or commercial activities like keeping track of inventory levels, checking for bank account balances, checking status of delivery of goods dispatched and all other business activities.

5.2.1 Classification of Business Applications

<table>
<thead>
<tr>
<th>Types of Business Applications</th>
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<tbody>
<tr>
<td><strong>Nature of Processing</strong> (The way an application updates data)</td>
</tr>
<tr>
<td>Batch Processing</td>
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<tr>
<td>Online Processing</td>
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<td>Real time Processing</td>
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<tr>
<td><strong>Source of Application</strong> (Tells the source from where the application has been bought)</td>
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<tr>
<td>In-house developed</td>
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<tr>
<td>Purchased application</td>
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<tr>
<td>Leased</td>
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<tr>
<td><strong>Nature of Business</strong> (Emphasize on size and complexity of Business Process)</td>
</tr>
<tr>
<td>Small Business</td>
</tr>
<tr>
<td>Medium Business</td>
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<tr>
<td>Large Business</td>
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<tr>
<td><strong>Functions Covered/Nature of Application</strong> (Based on business functions it covers)</td>
</tr>
<tr>
<td>Accounting Application</td>
</tr>
<tr>
<td>Cash Management</td>
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<tr>
<td>Manufacturing Application</td>
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</table>
5.2 Information Technology

Business applications may be classified on the basis of their nature and can vary in numerous ways. More types may be added to the list, depending upon the advancement in the area.

5.2.2 Business applications based on nature of application/functions covered


5.3 Business Process Automation

Business Process: It is a set of activities that are designed to accomplish specific organizational goals. Business Process Automation (BPA) is a strategy to automate business processes so as to bring benefit to enterprise in terms of cost, time and effort.

5.3.1 Why BPA?

Following are the primary reasons for automation by enterprises:

♦ Cost Saving: Automation leads to saving in time and labor costs.
♦ To remain competitive: To provide the level of products and services as offered by competition.
♦ Fast service to customers: Automation helps business managers to serve their customers faster and better.

5.3.2 How to go about BPA?

The steps to go about implementing business process automation are given as follows:

Step 1: Define why we plan to implement a BPA?

The answer to this question will provide justification for implementing BPA.

Step 2: Understand the rules/regulation under which it needs to comply with?

The underlying issue is that any BPA created needs to comply with applicable laws and regulations.

Step 3: Document the process, we wish to automate.

The current processes which are planned to be automated need to be correctly and completely documented at this step.

Step 4: Define the objectives/goals to be achieved by implementing BPA.

This enables the developer and user to understand the reasons for going for BPA. The goals need to be precise and clear.
Step 5: Engage the business process consultant.
Once the entity has been able to define the above, the entity needs to appoint an expert, who can implement it for the entity.

Step 6: Calculate the ROI for project.
The answer to this question can be used for convincing top management to say ‘yes’ to the BPA exercise.

Step 7: Development of BPA.
Once the top management grant their approval, the right business solution has to be procured and implemented or developed and implemented covering the necessary BPA.

Step 8: Testing the BPA.
Before making the process live, the BPA solutions should be fully tested.

5.3.3 Applications that help entity to achieve BPA
TALLY, SAP R/3, MS Office Applications, Attendance systems, Vehicle Tracking Systems, Automated Toll Collection Systems, Department Stores System, Travel Management Systems etc. are some of the applications that help entity to achieve Business Process Automation.

5.4 Information Processing
Information may be defined as processed data, which is of value to the user and is necessary for decision making and survival of an entity as success of business depends upon making right decisions at the right time on the basis of the right information available. The effort to create information from raw data is known as Information Processing. Classification of information is based on level of human or computer intervention.

5.5 Delivery Channels
Delivery channels refer to the mode through which information or products are delivered to users. For example:

Delivery Channels for Information: Include Intranet, E-mail, Internal newsletters and magazines; Staff briefings, meetings and other face-to-face communications methods; Notice boards in communal areas; Manuals, guides and other printed resources; Hand-held devices (PDAs, etc.); and Social networking sites like Facebook, WhatsApp etc.

Delivery Channels for Products: Include Traditional models, brick and mortar type; Buying from a shop; Home delivery of products; Buying from a departmental store; and Buying online, getting home delivery and making cash payment on delivery etc.

5.5.1 Importance
It is important to have proper and accurate delivery channels for information or product distribution and to consider each of these channels while planning; an overall information management and communications strategy are required.
5.4 Information Technology

5.5.2 Information Delivery Channel: How to choose one?
When choosing appropriate delivery channels, one should understand staff needs & environment. It should be more than just the intranet. Further, traditional channel need to be formalized.

5.5.3 Product Delivery Channels: How to choose one?
The customers have moved from purchase of physical books to e-books. This shift has forced business to strategize their delivery channels.

5.6 Controls in BPA
To ensure that all information that is generated from system is accurate, complete and reliable for decision making, there is a requirement for proper controls. Control is defined as policies, procedures, practices and organization structure that are designed to provide reasonable assurance that business objectives are achieved and undesired events are prevented or detected and corrected.

5.6.1 Control Objectives
Major control objectives are - Authorization, Completeness, Accuracy, Validity, Physical Safeguards and Security, Error Handling and Segregation of Duties.

5.6.2 Types of Controls

<table>
<thead>
<tr>
<th>Application Controls</th>
<th>Internal Controls</th>
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<tbody>
<tr>
<td>Application controls are the controls on the sequence of processing events. These controls cover all phases of data right from data origination to its final disposal. Application controls cover transactions as they recorded in each stage of processing into master - parameter and transaction files and include controls relating to transmission and distribution of output through display, electronic media or printed reports.</td>
<td>SA-315 defines the system of internal control as the plan of enterprise and all the methods and procedures adopted by the management of an entity to assist in achieving management’s objective of ensuring, as far as practicable, the orderly and efficient conduct of its business, including adherence to management policies, the safeguarding of assets, prevention and detection of fraud and error, the accuracy and completeness of the accounting records, and the timely preparation of reliable financial information.</td>
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</table>
5.6.3 Application Controls and their Types

**Application Control**

**Boundary Control**
An Access control mechanism having three steps: Identification, Authentication and Authorization.

**Input Controls**
Responsible for ensuring the accuracy and completeness of data that are input into an application system.

**Process Controls**
Responsible for performing validation checks to identify errors during processing of data system.

**Output Controls**
Ensure that the data delivered to users is presented, formatted and delivered in a consistent and secured manner.

**Database Controls**
Protects the integrity of a database when application software act as an interface between user and the database.

**Cryptography**
Transforming data into codes that are meaningless for a non-authenticated person.

**Source Document Control**
Can be used to remove assets from the enterprise.

**Data Coding Control**
These are put in place to reduce user error during data feeding.

**Run-to-run totals**
Helps in verifying data that is subject to process through different stages.

**Reasonable-ness Verification**
Two or more fields can be compared and cross verified to ensure their correctness.

**Storage and Logging of Sensitive and Critical Forms**
Access of pre-printed stationery like security forms etc. to only authorized persons.

**Logging of output program executions**
Output programs should be logged and monitored.

**Sequence Check Transaction and Master Files**
Synchronization between master file and transaction file to maintain the integrity between the two files.

**Exception Reports**
Are generated to identify errors in processed data.

**Controls over Printing**
Ensure that unauthorized disclosure of information printed is prevented.

**Report distribution and Collection Controls**
Deals with secure way to avoid unauthorized disclosure of data and maintenance of log as to what reports are printed and collected.

**Existence/Recovery Controls**
Enable a system to be recovered if failure is temporary or localized.

**Retention Controls**
Consider the duration for which outputs should be retained before being destroyed.

**Existence/Rec overy Controls**
Are needed to recover output in the event that is lost or destroyed.

**Process multiple transactions for a single record in the correct order**
Transactions are processed against the product master record in the correct order.
5.7 Emerging Technologies

Various emerging technologies/concepts are given in the following sections:

5.7.1 Network Virtualization

In Information Technology, **Virtualization** is the process of creating logical computing resources from available physical resources.

5.7.2 Grid Computing

In an ideal **Grid Computing System**, every resource is shared, turning a computer network into a powerful supercomputer. Every authorized computer would have access to enormous processing power and storage capacity. A grid computing system can be as simple as a collection of similar computers running on the same operating system or as complex as inter-networked systems comprised of every computer platform we can think of.

5.7.3 Cloud Computing

**Cloud Computing** is the use of various services, such as software development platforms, servers, storage, and software, over the Internet, often referred to as the "cloud." The common Cloud Computing Service Models are **Software as a Service (SaaS)**, **Platform as a Service (PaaS)** and **Infrastructure as a Service (IaaS)**.

Question 1

*What are the objectives of Business Process Automation (BPA)?*

**Answer**

The success of any business process automation shall only be achieved when BPA ensures:

- **Confidentiality**: To ensure that data is only available to persons who have right to see the same;
- **Integrity**: To ensure that no unauthorized amendments can be made in the data;
- **Availability**: To ensure that data is available when asked for; and
- **Timeliness**: To ensure that data is made available in at the right time.

To ensure that all the above parameters are met, BPA needs to have appropriate internal controls put in place.

**Question 2**

*Differentiate between Manual Information Processing Cycle and Computerized Information Processing Cycle.*
Answer

<table>
<thead>
<tr>
<th>Manual Information Processing Cycle</th>
<th>Computerized Information Processing Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systems where the level of manual intervention is very high. For example: Evaluation of exam papers, teaching and operations in operation theatres.</td>
<td>Systems where computers are used at every stage of transaction processing and human intervention is minimal.</td>
</tr>
</tbody>
</table>
| Include following components:  
  - **Input**: Put details in register.  
  - **Process**: Summarize the information; and  
  - **Output**: Present information to management in the form of reports. | Include following components:  
  - **Input**: Entering data into the computer;  
  - **Process**: Performing operations on the data;  
  - **Storage**: Saving data, programs, or output for future use; and  
  - **Output**: Presenting the results. |

Question 3

*What are the major control objectives in Business Process Automation (BPA)?*

**Answer**

Control is defined as policies, procedures, practices and organization structure that are designed to provide reasonable assurance that business objectives are achieved and undesired events are prevented or detected and corrected. Major control objectives are given as follows:

- **Authorization** – ensures that all transactions are approved by responsible personnel in accordance with their specific or general authority before the transaction is recorded.
- **Completeness** – ensures that no valid transactions have been omitted from the accounting records.
- **Accuracy** – ensures that all valid transactions are accurate, consistent with the originating transaction data, and information is recorded in a timely manner.
- **Validity** – ensures that all recorded transactions fairly represent the economic events that actually occurred, are lawful in nature, and have been executed in accordance with management’s general authorization.
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♦ **Physical Safeguards and Security** – ensures that access to physical assets and information systems are controlled and properly restricted to authorized personnel.

♦ **Error Handling** – ensures that errors detected at any stage of processing receive prompts corrective actions and are reported to the appropriate level of management.

♦ **Segregation of Duties** – ensures that duties are assigned to individuals in a manner that ensures that no one individual can control both the recording function and the procedures relative to processing a transaction.

**Question 4**

*What are the characteristics of Cloud Computing?*

**Answer**

The following is a list of some of the characteristics of a cloud-computing environment:

♦ **Elasticity and Scalability:** Cloud computing gives us the ability to expand and reduce resources according to the specific service requirement. For example, we may need a large number of server resources for the duration of a specific task. We can then release these server resources after we complete our task.

♦ **Pay-per-Use:** We pay for cloud services only when we use them, either for the short term or for a longer duration.

♦ **On-demand:** Because we invoke cloud services only when we need them, they are not permanent parts of the IT infrastructure. With cloud services, there is no need to have dedicated resources waiting to be used, as is the case with internal services.

♦ **Resiliency:** The resiliency of a cloud service offering can completely isolate the failure of server and storage resources from cloud users. Work is migrated to a different physical resource in the cloud with or without user awareness and intervention.

♦ **Multi Tenancy:** Public cloud service providers often can host the cloud services for multiple users within the same infrastructure. Server and storage isolation may be physical or virtual depending upon the specific user requirements.

♦ **Workload Movement:** This characteristic is related to resiliency and cost considerations. Cloud-computing providers can migrate workloads across servers both inside the data center and across data centers (even in a different geographic area).

**Question 5**

*Discuss advantages and disadvantages of Cloud Computing.*

**Answer**

**Advantages of Cloud Computing:** It is a cost efficient method to use, maintain and upgrade with almost unlimited storage. It provides an easy access to information and is usually competent enough to handle recovery of information. In the cloud, software integration occurs automatically and the entire system can be fully functional in a matter of a few minutes.
Disadvantages of Cloud Computing: This technology is always prone to outages and other technical issues and surrendering all the company's sensitive information to a third-party cloud service provider makes the company vulnerable to external hack attacks and threats.

Exercise

1. Discuss some of the applications that help enterprise to achieve Business Process Automation.
2. How can controls be classified based on the time at which they are applied?
3. What do you mean by the term “Virtualization”? Discuss its major applications.
4. Discuss the steps involved in implementing Business Process Automation.
5. Define the following terms in brief.
   (a) Cloud Computing
   (b) Grid Computing
   (c) Control in BPA
6. Discuss the major parameters that need to be considered while choosing an appropriate delivery channel for information.
7. Discuss Boundary Controls in details.
8. What do you understand by Database Controls? Discuss in brief.
9. Differentiate between Input Controls and Output Controls.
10. How Process Controls are used to have consistency in the control process?