I. Before you read: What do you know about Boeing company?

II. Read the text quickly. What has been the driving force behind the development of the IMA?

Since 1988, the avionics industry has made a significant effort to develop the requirements and goals for a next-generation integrated avionics architecture.[…] Top-level goals of the **Integrated Modular Avionics** (IMA) architecture are to reduce overall cost of ownership through reduced spares requirements (includes reduction in cost of spare **Line Replaceable Modules** [LRM] and reduction in number of LRMs required), reduce equipment removal rate, and reduce weight and volume in both avionics and wiring. In addition, IMA addresses the airlines' demand for better **MTBUR/MTBF** (Mean Time Between Unscheduled Removals as a fraction of Mean Time Between Failures), improved system performance (response time), increased airborne functionality, better fault isolation and test, and maintenance-free dispatch for extended intervals. Technology trends in microprocessor and memory technology demand that airborne computing architectures evolve if the avionics industry is to meet the goals of IMA. By exploiting these developments in the microprocessor and memory industries very highly integrated architectures previously not technologically **feasible** or cost-effective may now be realized. These functionally integrated architectures minimize life cycle cost by minimizing the duplication of hardware and software elements.
High levels of functional integration dictate availability and integrity requirements far exceeding the requirements for federated architectures. Resource availability requirements must be sufficient to probabilistically **preclude** the simultaneous loss of multiple functions utilizing shared resources. These availability requirements imply application of fault-tolerant technology. Although fault tolerance is required to meet the integrity and availability goals of IMA, it is also directly compatible with the airline goal for **deferred maintenance**. Furthermore, since fault-tolerant technology requires high-integrity monitoring, it also is compatible with airlines' desires for improved fault isolation, better maintenance diagnostics, and reduced unconfirmed removal rate (MTBUR). Current IMA implementations are realizing a more than six times improvement in unconfirmed equipment removals over a typical federated Line Replaceable Unit-based (LRU-based) architecture. High functional integration also implies the requirement to maintain functional independence for software using any shared resource. Strict CPU separation is not sufficient to ensure that functions will not adversely affect each other. **Input-output (I/O)** resource sharing demands a **backplane bus** architecture that has extremely high integrity and enforces rigid partitioning between all users. Processor resource sharing requires a robust software partitioning system in which all partition protection elements are monitored to ensure isolation integrity. Robust **partitioning** protection must be performed as an integral part of the architecture, and isolation must not be dependent upon the integrity of the application software. In this environment, the robust partitioning architecture would be certified as a **standalone** element allowing functional software to be updated and certified independently of other functions sharing the same computational or I/O resources. Since it is anticipated that airborne functionality will continue to increase and that the majority of this increase will be accommodated via software changes alone, this partitioned environment will provide flexibility in responding to evolving system requirements (e.g., CNS/ATM).
Now in its second-generation implementation, the Boeing 777 **AIMS** implements the IMA concept in an architecture supporting a high degree of functional integration and reducing duplicated resources to a minimum. In this architecture, the conventional LRUs, which

typically contain a single function, are replaced with dual integrated cabinets, which provide the processing and the I/O hardware and software required to perform the following functions:
• Flight Management
• Display
• Central Maintenance
• Airplane Condition Monitoring
• Communication Management (including flight deck communication)
• Data Conversion Gateway

III. Match the words and phrases in the bold to the definitions below.

1. real-time computer network airborne systems. This network consists of a number of computing modules capable of supporting numerous applications of differing criticality levels.

2. the "brains" of Boeing 777 aircraft. It uses four ARINC 629 buses to transfer information. There are 2 cabinets on each plane (Aircraft Information Management System)

3. a modular component of an airplane, ship or spacecraft (or any other manufactured device) that is designed to be replaced quickly at an operating location (1st line).

4. the predicted elapsed time between inherent failures of a mechanical or electronic system, during normal system operation. (średni okres międzywaryjny/(średni okres trwania danej części w urządzeniu)

5. that is possible and likely to be achieved

6. to prevent something from happening or somebody from doing something; to make something impossible

7. the practice of postponing maintenance activities such as repairs on both real property (i.e. infrastructure) and personal property (i.e. machinery) in order to save costs, meet budget funding levels

8. the communication between an information processing system, such as a computer, and the outside world, possibly a human or another information processing system.

9. a group of electrical connectors in parallel with each other, so that each pin of each connector is linked to the same relative pin of all the other connectors, forming a computer bus. It is used as a backbone to connect several printed circuit boards together to make up a complete computer system.

10. (especially of a computer) able to be operated on its own without being connected to a larger system

IV. Work in pairs. Find out the following information.

Student A: ask student B for the following information Boeing 777:

1. The time of the first flight.

2. The location of the first flight.

3. The size of the fuselage.

4. The wingspan.

5. The type of wing used.

6. The number of passengers.

8. Three questions of your own concerning avionics.

Student B ask student A for the following information:

1. The first destination.

2. Common routes.

4. The engines used.

5. The maximum thrust.

6. The maximum speed.

7. The cruising speed.

8. Three questions of your own concerning the avionics