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Ground Support Equipment (GSE) for Aircraft Condition Monitoring System (ACMS)

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1. Purpose

Ground Support Equipment (G S E) is used for aircraft and engine maintenance. Its primary functions are :

- Change of DMU programmation
  (parameter calibration, data recorder format)
- Retrieval and decompression of S.A.R. aircraft data
- Retrieval of reports and A D E P T / A P M automatic processing.

All the information are stored in a data base and a fleet management is assumed.

2. General description of ACMS system

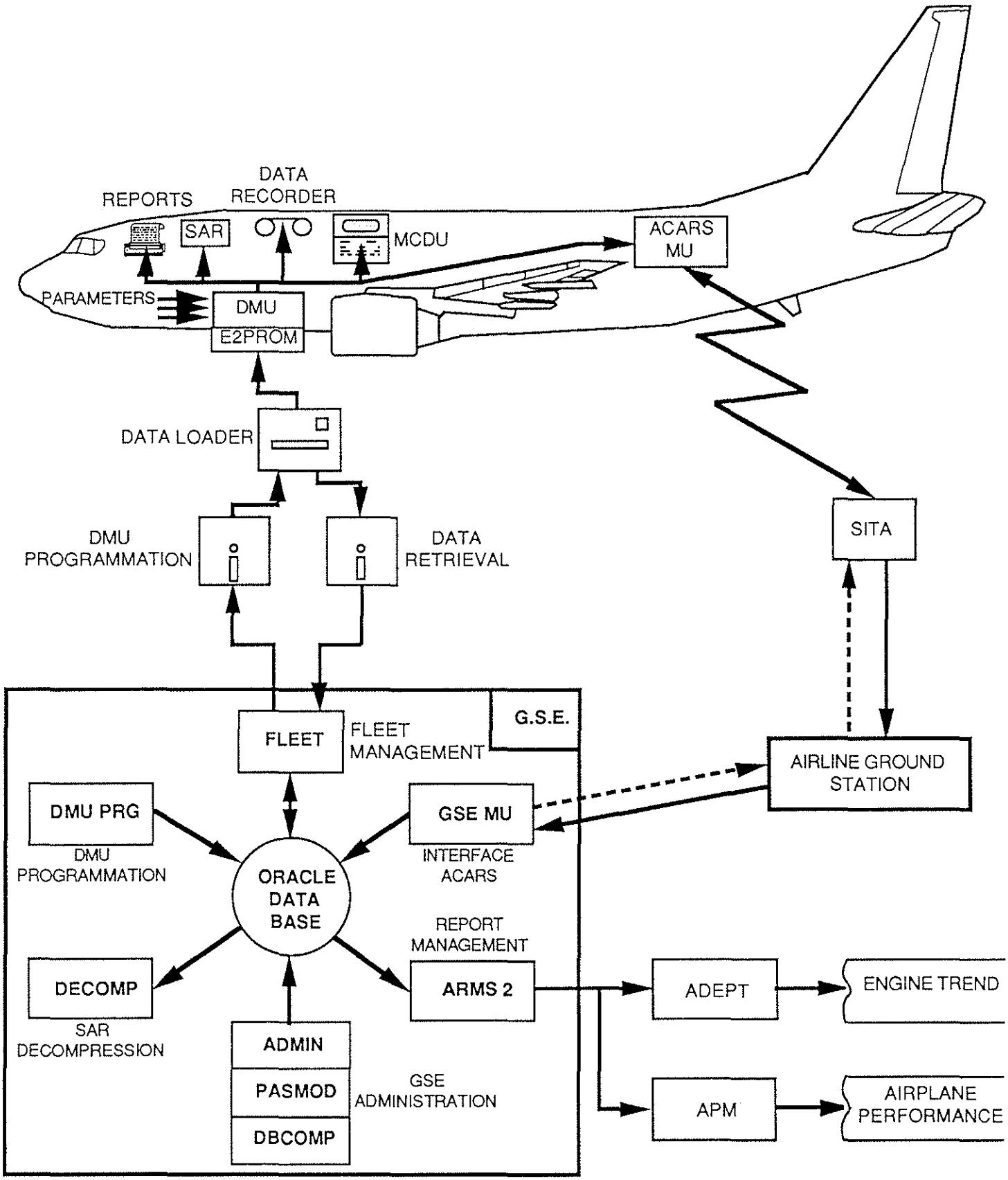
For maintenance requirements, it is necessary to acquire and to memorize aircraft data during its flight.

The data is acquired by the maintenance module (DMU), stored in a magnetic data recorder and in a mass memory recorder (SAR). It can be sent to the pilot via a terminal (MCDU) and an on-board printer.

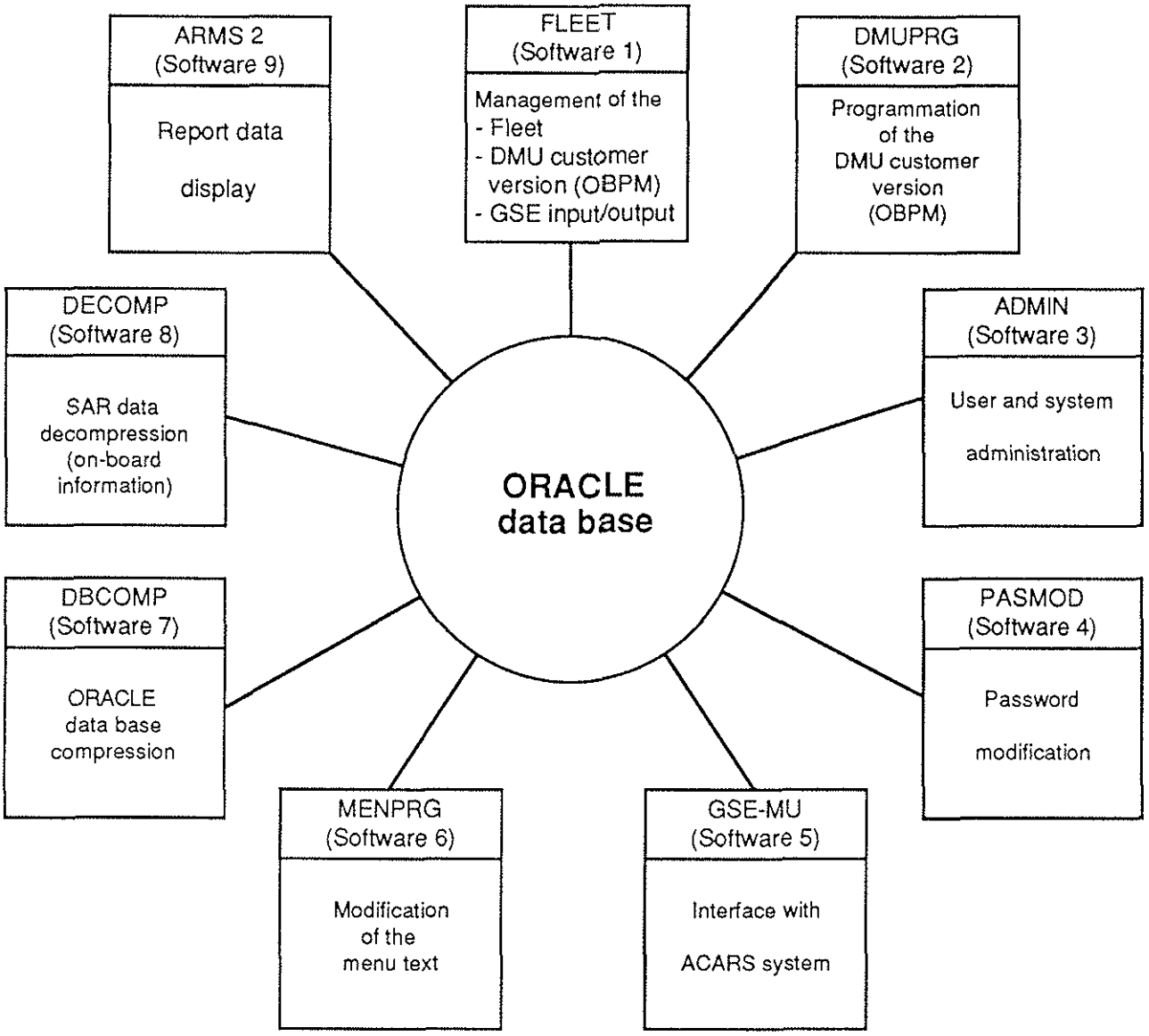
The data acquisition and its output towards the different equipment mentioned above is totally programmable by the Ground Support Equipment (G.S.E) with a floppy disk through the on-board data loader.

Recovering of stored data is done either by ACARS transmission or by a floppy disk once the aircraft is back on ground. The information are stored in the GSE data base. Then, GSE can process ADEPT and APM trend monitoring, SAR data decompression.

Architecture of SFIM Aircraft Condition Monitoring



3. Introduction to GSE software



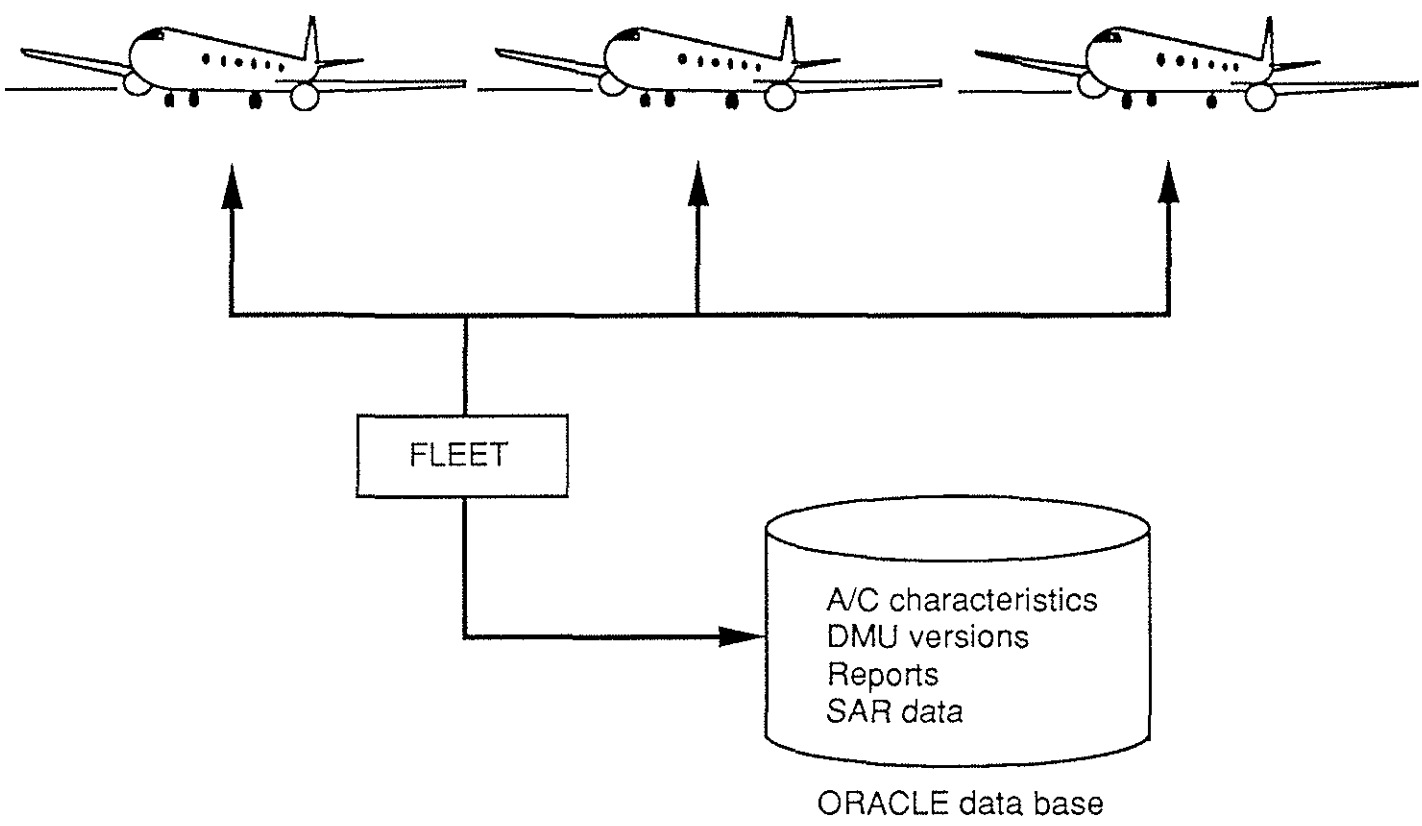
Ground Support Equipment is devided into 9 software modules making it modular. Each software reads and/or writes information into a relational data base management system of ORACLE type.

The softwares modules are :

1. FLEET : Management of fleet, DMU versions and input/output external to GSE
2. DMUPRG : Programmation of DMU functions
3. ADMIN : Management of system and categories of persons required to use GSE
4. PASMOD : Modification of each user passwords
5. GSE-MU : Interface with the ACARS system
6. MENPRG : Modification of the menu presentation
7. DBCOMP : Compression of the ORACLE data base
8. DECOMP : Decompression of the SAR data
9. ARMS2 : Management of reports, ADEPT and APM execution

4. Fleet management

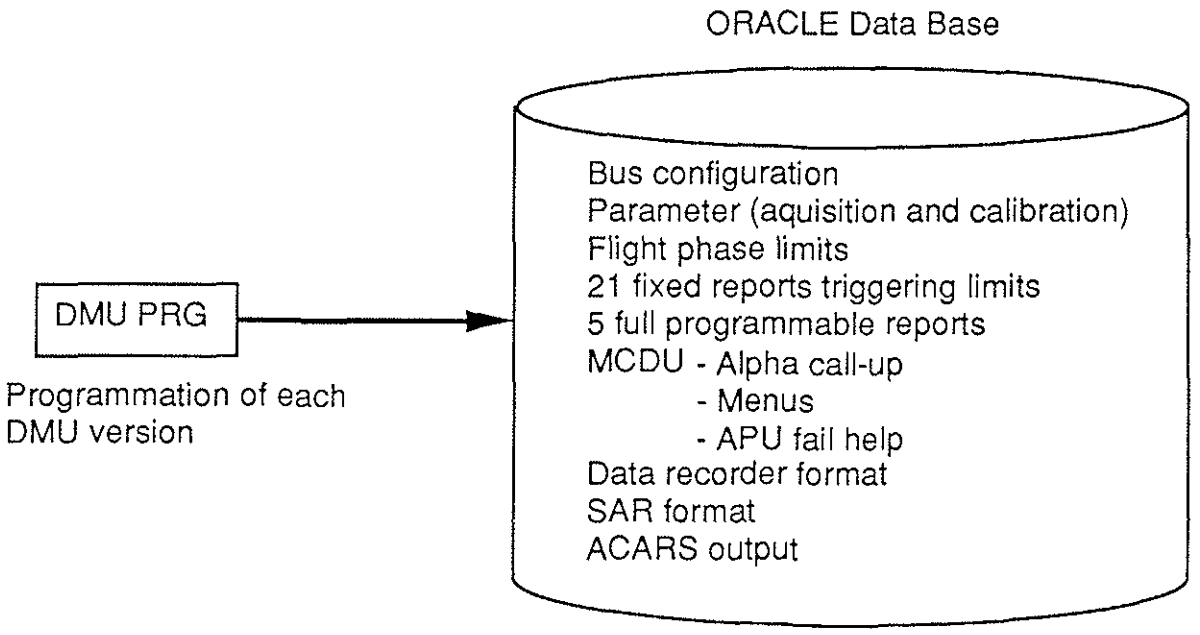
TAIL : D-ABXA	TAIL : D-ABXB	TAIL : D-ABVX
A/C : 1	A/C : 2	A/C : 255
ESN-L : 100001	ESN-L : 200001	ESN-L : 300001
ESN-R : 100002	ESN-A : 200002	ESN-R : 300002
DMU : 1	DMU : 1	DMU : 2 (TEST VERSION)



Fleet management consists in :

- Aircraft definition (A/C Type, Engine configuration, DMU version)
- DMU version definition
- GSE output : floppy disk for DMU programmation
- GSE input : floppy disk with SAR data and reports

5. Programmation of Data Management Unit

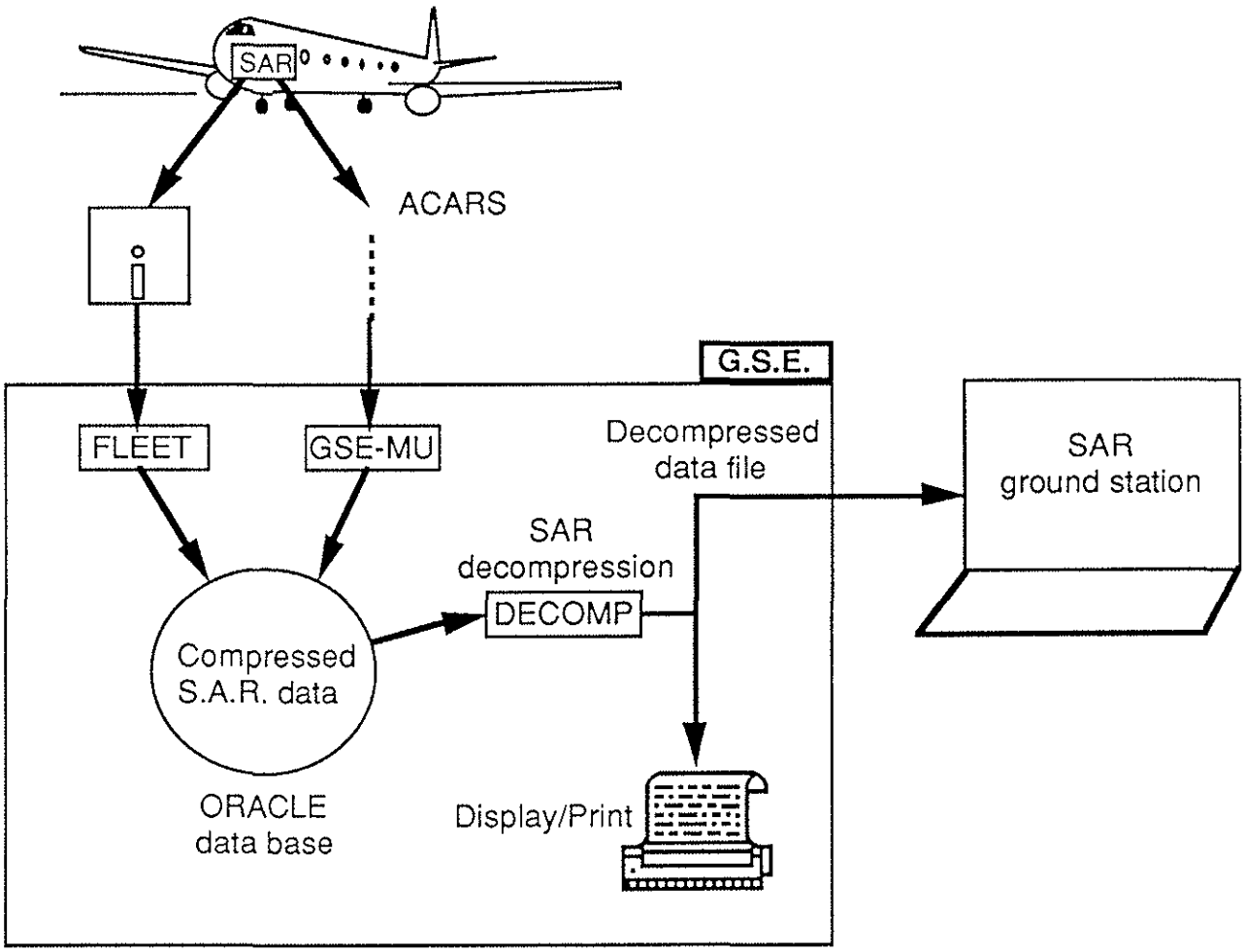


DMU PRG is used to modify a DMU customer version. The programmable data are :

- DMU inputs : Bus configuration and parameters
- DMU outputs : Reports, MCDU, data recorder, SAR and ACARS definition

GSE checks for the consistency between all information and at the end of a modification session, generates compressed tables to be loaded into DMU's E2PROM via the data loader.

6. Smart Access Recorder Data Decompression

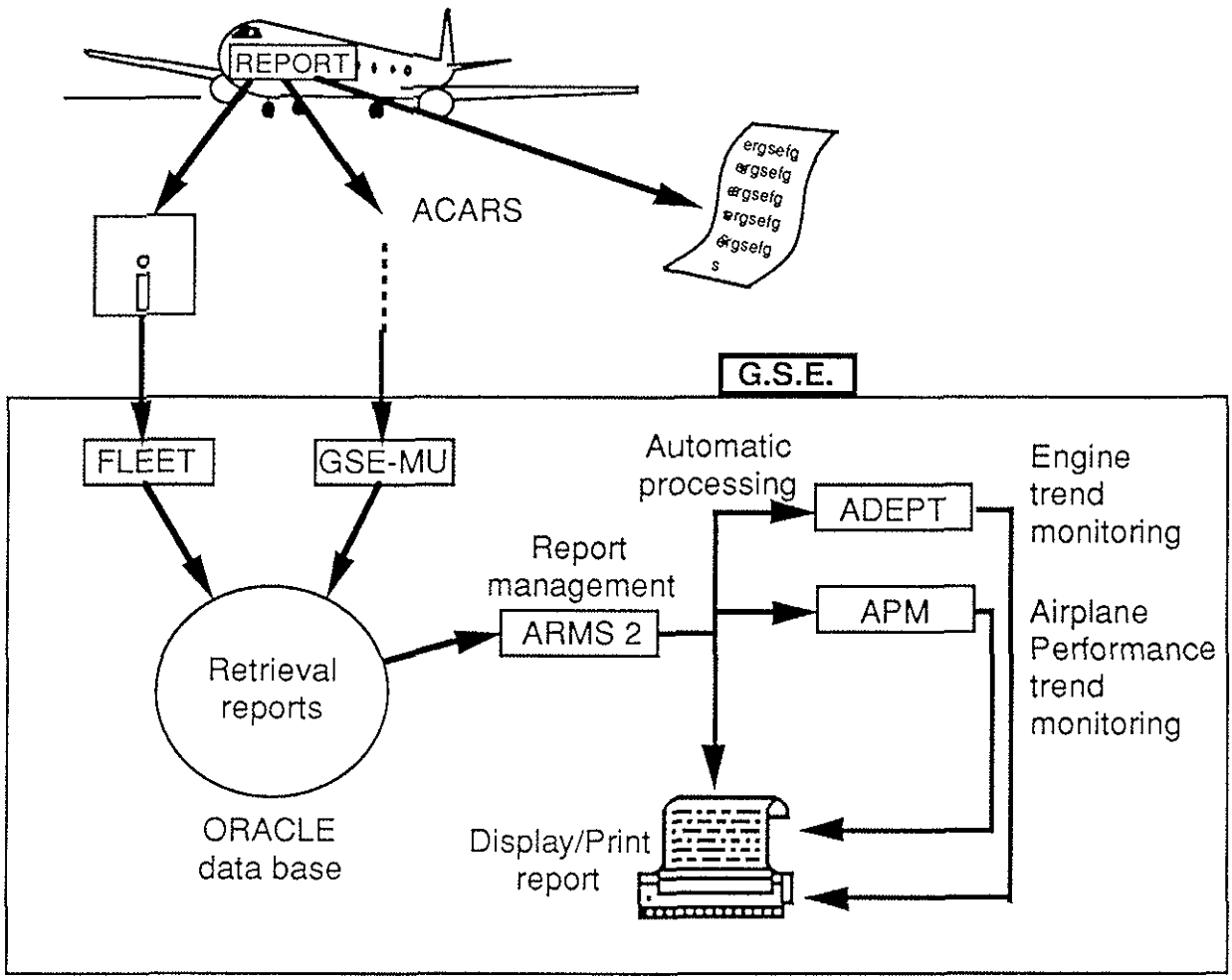


The SAR data like aircraft path are compressed and stored during the flight into a mass memory recorder.

It is sent to GSE with floppy disk media or by ACARS transmission.

The data are decompressed in order to be clearly displayed or to be sent to the SAR ground station.

7. ADEPT and APM interface



During the flight, several kinds of reports can be generated like stability, exceedance reports. All these reports are sent to GSE by floppy disk or by ACARS transmission.

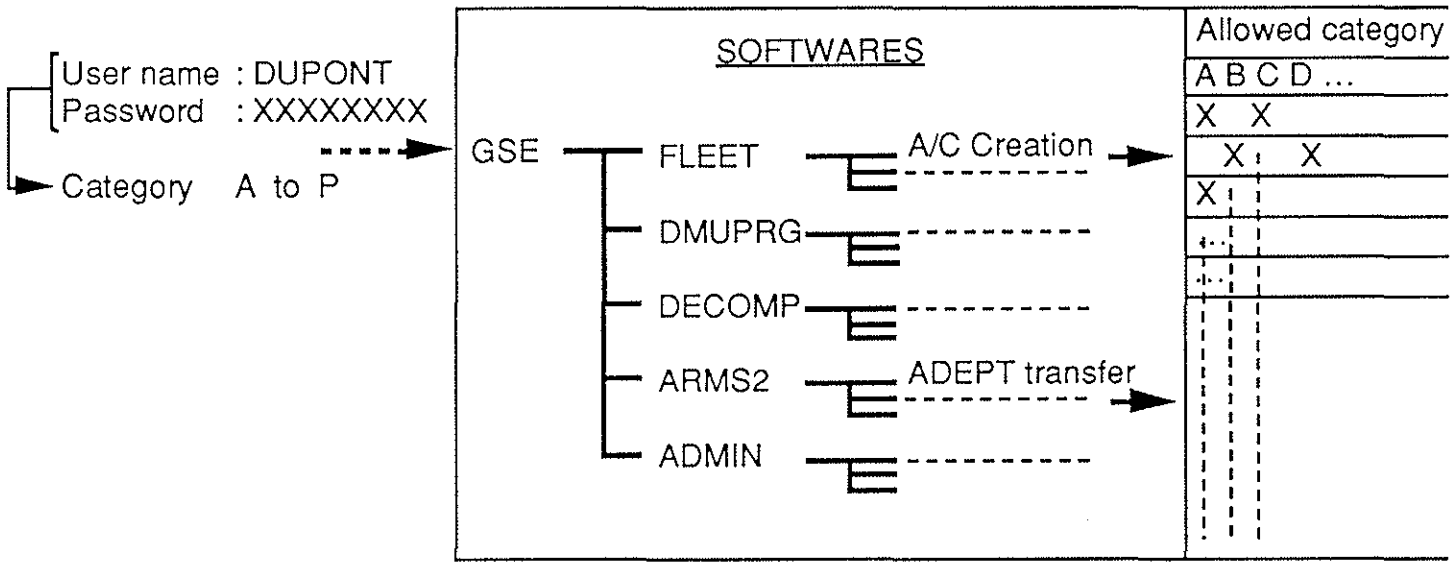
Then, CFMI ADEPT is automatically performed using :

- Cruise reports for engine trend monitoring
- Take-off reports for outside air temperature limit computation

BOEING APM is automatically performed using airplane performance report (consumption data and evolution of gravity center)

GSE will also display report stored in the ORACLE data base.

8. User management



Access to GSE is possible only by entering a user name and password.

All defined users are classified into 16 categories A to P (Pilots, Maintenance,...)

The functions of all the 9 GSE softwares are access protected according to the 16 categories as shown above (a "X" means that the category is allowed to access to the function).

A. Hardware and software requirements

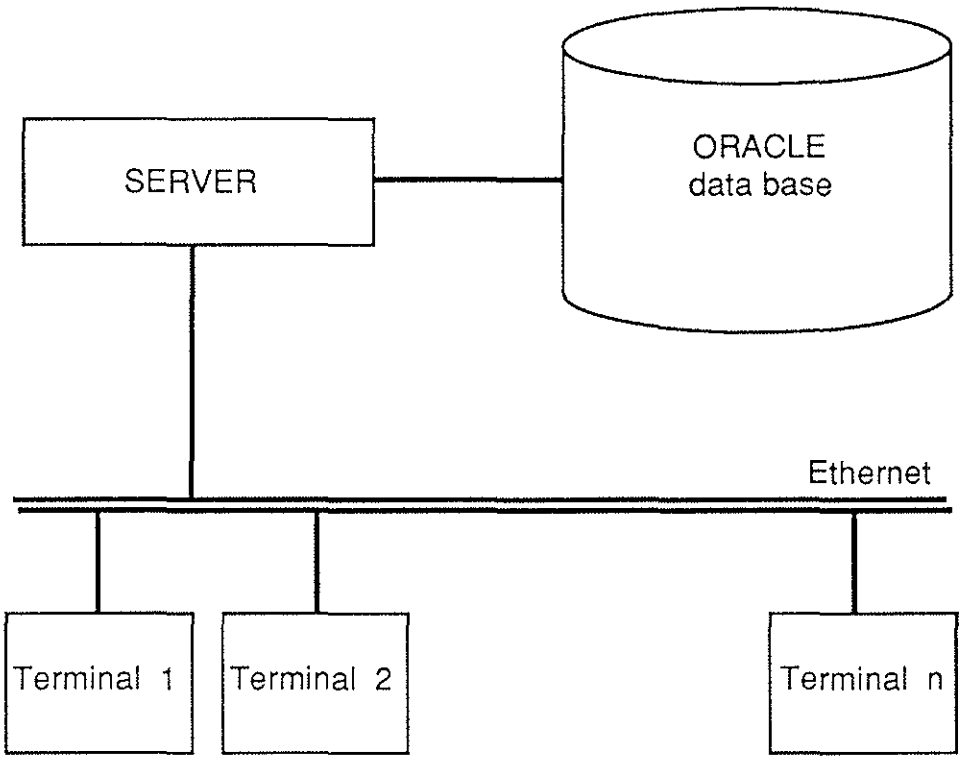
Hardware

- 1 BM - PC ≥ 286 ≥ 16 MHz
- Printer 80 or 132 columns
- Floppy disk drive 3" 1/2 HD
- Hard disk ≥ 80 MB
- RAM extension ≥ 4 MB

Software

- ORACLE RDBMS for PC V5. 1C
- MICROTEC C - 68000 cross compiler
- DOS ≥ 3.3
- Test editor

B. Network configuration



An evolution of GSE can be its translation into a network configuration in order to :

- Report softwares on different PC
- Centralize data base on high capacity hard disk