Internals - 02

MES (18CS14)

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CSE 'A' Sec

1a.

General Computing System	Embedded System
1. A combination of generic hardware & general purpose operating system (GPOS) for executing a variety of applications.	1. A combination of special purpose hardware Embedded OS for executing a specific set of applications.
2. Applications are alterable by the user.	2. Application is not altered by end-user, firmware is preprogrammed.
3. Performance is the key deciding factor in the selection of the system.	3. Application specific requirements like performance, power, memory usage.
4. Less / not at all tailored towards reduced operating power requirements.	4. Highly tailored to take advantage of the power saving modes supported by the hardware & the OS.
5. Need not be determine in execution behaviour response requirements are not time critical.	5. Execution behaviour is deterministic for certain type of embedded systems like 'Hard Real Time' systems.

16. Types of Embedded System based on Generation,

First generation :- 8 bit microprocessor & 4-bit microcontroller like 8085 & Z80 was used in 1G. Hardware circuit was simple, Assembly code is used for developing firmware. Ex:- digital telephone keypads, stepper motor.

Second generation :- uses 16 bit microprocessor & 8 bit microcontroller. They are more complex & powerful than 1G.

Ex:- Data acquisition systems like ADC, SCADA.

Third Generation :- uses 32 bit microprocessor & 16 bit microcontroller. Domain specific processor & controllers are used. Ex:- Robotics.

Fourth generation :- uses 64 bit microprocessor & 32 bit microcontroller. The concept of system on chip, multi core processors evolved. Highly complex & very powerful.

Ex:- Smart phones.

Types of Embedded System based on Complexity & performance

1. Small Scale :- Embedded systems which are simple in application needs & the performance parameters are not time critical. They are built around low cost & performance 8 or 16 bit microprocessors / controllers.

Ex:- Electronic toy.

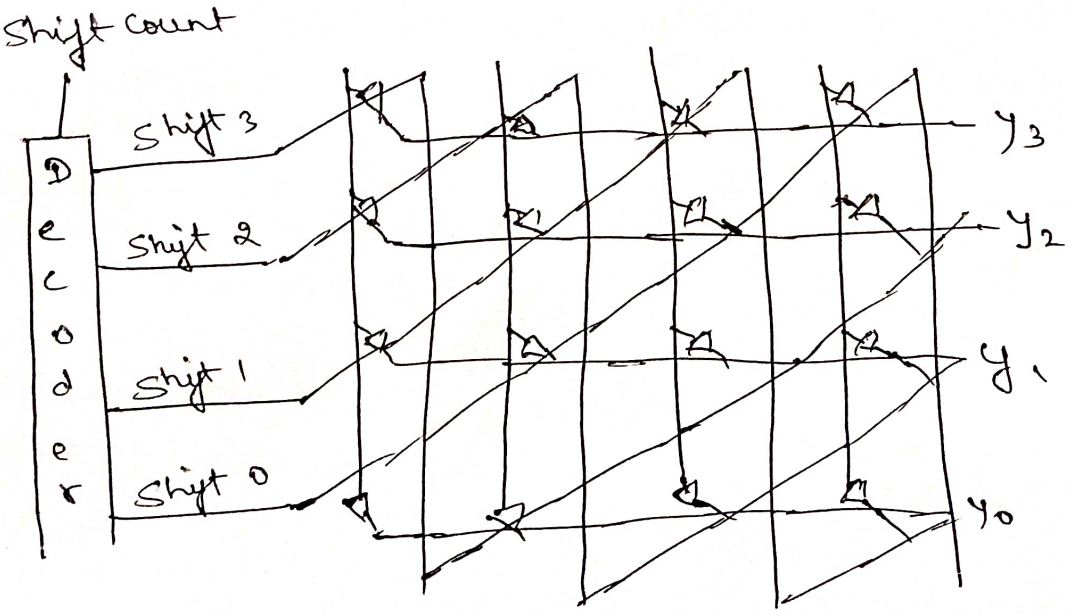
2. Medium Scale :- Embedded system which are slightly complex in hardware & firmware requirements. Medium-Scale Embedded System are usually built

around medium performance.

Large Scale :- or complex Embedded Systems, which involve highly complex hardware & firmware. They are used in mission critical applications demanding high performance.

10. A barrel Shifter is a digital circuit that can shift a data word by a specified number of bits without the use of any sequential logic, only combinational logic, i.e it inherently provides a binary operation.

A barrel shifter is often used to shift and rotate n bits. ~~A barrel~~ A barrel shifter is often implemented as a cascaded of parallel 2×1 multiplexers. For an 8 bit parallel shifter, two intermediate signals are used which shifts by four & two bits or passes the same data based on the value of S[2] & S[1].



4 bit cross bar barrel shifter.

24b. Swap instruction:-

SWP - Swap a word between memory and a Register.

SWPB - Swap a byte between memory and a Register.

This instruction is a special case of a load-store instruction. It is an atomic operation. It reads and writes a location in same bus operation. It also prevents other instructions from accessing the bus until swap is completed.

Coprocessor instructions:-

Coprocessor instructions are used to extend instruction set. This include data processing, Register transfer & Memory transfer.

CDP - Coprocessor Data Processing.

MRC / MCP - Coprocessor Register transfer.

LDC - Coprocessor Memory transfer.