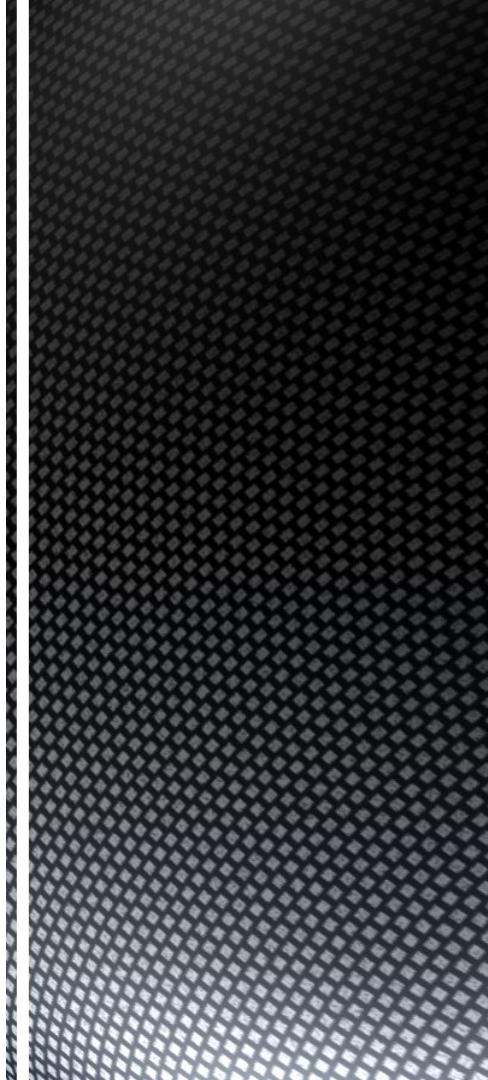# Automation (21-541)

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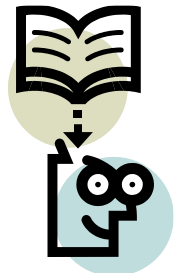
Session # 4

Session Schedule

- *CIM hardware and software considerations*
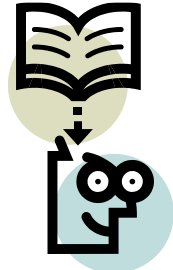 - *A brief case study for CIM database design*

Introduction to manufacturing automation and CIM *(Computer Integrated Manufacturing)*

- *Automation:*
  - *set of all measures aiming at replacing human work through machines*
    (e.g. automation is applied science)
  - *the technology used for this purpose*
    (e.g. this company has an automation department)

- *Automation:*
  - *replacement of human work through machines*
    (e.g. the automatisation of the textile factory caused uproar of the workers)
  - *replacement of conscious activity by reflexes*
    (e.g. drill of the sailors allows the automatisation of ship handling)

- *Automation:*
  - *The use of computers and machines instead of people to do a job*

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CIM hardware and software considerations

- *CIM equipment:*
  - *CNC machines*
  - *Computerized work centers*
  - *Robotic work cells*
  - *DNC/FMS systems*
  - *Work handling and tool handling devices*
  - *Storage devices*
  - *Sensors, shop floor data collection devices*
  - *Inspection machines*
  - *Computers, controllers*
  - *CAD/CAM systems, workstations / terminals, data entry terminals, bar code readers, RFID tags*
  - *Printers, plotters and other peripheral devices, modems, cables, connectors*

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CIM hardware and software considerations

- *CIM software comprises computer programs like:*
  - *Management Information System; Database Management*
  - *Sales, Order Entry*
  - *Marketing*
  - *Finance*
  - *Analysis; Modeling and Design*
  - *Simulation*
  - *Inventory Control; Materials Handling*
  - *Monitoring; Shop Floor Data Collection*
  - *Process Planning*
  - *Manufacturing Facilities Planning; Production Control*
  - *Work Flow Automation*
  - *Quality Management*

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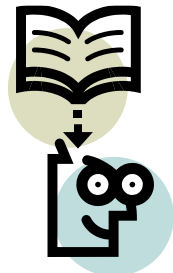
CIM Database management

▪ *Varied tasks one might expect to accomplish in a CIM environment:*

  ▪ *Designing assemblies and performing tolerance analysis on those assemblies.*

  ▪ *Preparing production drawings of assemblies, individual parts, tooling, fixtures and other manufacturing facilities.*

  ▪ *Preparing part lists and bill of materials (BOM).*

  ▪ *Preparing process plans for individual part manufacture and assembly.*

  ▪ *Programming CNC machines for processing complete parts (CAM).*

  ▪ *Designing work cells and programming the movement of components in those cells using work handling devices like robots, conveyors, AGV's/ RGV's.*

  ▪ *Preparing inspection programs including programs for CNC machines.*

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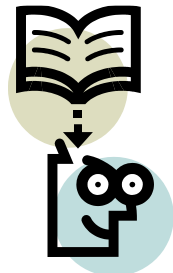
Make your own CIM database !!

- *Third step:*
  - *Theoretically plan the procedures which enable:*
    - *The storage of object related data (attributes)*

    - *The sort of data related to an array of objects (Tables, Primary keys)*

    - *The storage of relation among related objects (relational database, Foreign keys)*

    - *The retrieve operation of a definite object by means of its attributes (Select)*

    - *The modification/delete operation of a definite object by means of its attributes (Update/Delete)*

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Make your own CIM database !!

- *Third step: (Continued …)*
  - *Theoretically plan the procedures which enable:*
    - *The transfer of your data base from one computer to another (Back up operation)*

    - *The extract of information from an array objects (Information)*

    - *The extract of knowledge from a series of information (knowledge)*

- *000001 <<HEADER>>*   *;}*
- *000002 DATABASENAME*   *;}*
- *000003 DATABASELOCATION*   *;}*
- *000004 DATABASECREATOR*   *;}*
- *000005 <<T>>   POINT*   *;}*
- *000006 <<T>>   LINE*   *;}*
- *000007 <<A>>   PCODE   000005*   *;}*
- *000008 <<A>>   PX   000005*   *;}*
- *000009 <<A>>   PY   000005*   *;}*
- *000010 <<A>>   PZ   000005*   *;}*
- *000011 <<A>>   LCODE   000006*   *;}*
- *000012 <<A>>   PSCODE   000006*   *;}*
- *000013 <<A>>   PFCODE   000006*   *;}*
- *000014 <<K>>   PCODE   000007*   *;}*
- *000015 <<K>>   LCODE   000011*   *;}*
- *000016 <<F>>   STTPOINT   000012   000007*   *;}*
- *000017 <<F>>   FNSPOINT   000013   000007*   *;}*
- *001001 <<DATA>>*   *;}*
- *001002 000002   TEST1*   *;}*
- *001003 000003   D:\TEST FOLDER*   *;}*
- *001004 000004   OMID FATAHI*   *;}*
- *001005 000001   TEST1*   *;}*
- *001006 000005   <<ROW>>*   *;}*
- *001007 000007   1   001006*   *;}*
- *001008 000008   0   001006*   *;}*
- *001009 000009   0   001006*   *;}*
- *001010 000010   0   001006*   *;}*
- *001011 000005   <<ROW>>*   *;}*
- *001012 000007   2   001011*   *;}*
- *001013 000008   1   001011*   *;}*
- *001014 000009   1   001011*   *;}*
- *001015 000010   1   001011*   *;}*
- *001016 000006   <<ROW>>*   *;}*
- *001017 000011   1   001016*   *;}*
- *001018 000012   1   001016*   *;}*
- *001019 000013   2*   001016   *;}*   9

Homework: AT-G-01-#

- *Provide a simple implementation regards to your theoretical activities in steps one to three:*
  - *Define a simple discourse*
  - *Use a programming language*
  - *Define some simple objects in the selected discourse*
  - *Define some simple attributes for selected objects*
  - *Implement your theoretical procedures in step 3*

- *The HW should be sent to FValilai@sharif.edu till Saturday, 26th of Esfand (March, 17th,2014)*
- *Email subject: "AT-G-01-#"*