CoE/EE460
Switching Theory

Lecture7

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Announcements : Exam 1

- Exam 1 : Monday March 5 (in class)
  - Covers:
    - Course Material Though Wed. Feb 28
    - Textbook, chapters 1,3,4,5
    - Homeworks 1-3
  - You may bring (only):
    - Boolean Algebra Theorems & Postulates sheet (on web)
    - Your own 1-page [2 sided] Note sheet
  - You may not bring
    - Textbook
      - This is closed-book exam
    - Computation or communication device
      - Problems will be sufficiently small to work by hand

Announcements (Continued)

- Return Homework 2
  - Example of maxterm expansion
  - For each f(x,y)=0,
    - Generate Π(0-term=literal, 1-term=literal')
  - Example: f=xy'
- Lecture 6 Review
- Homework 3 Assigned
  - Tabular method and prime implicants
  - Includes programming assignments
  - Start Early!

Programming Assignment

- You are free to use any language or programming environment to implement homework.
- You must implement your own code for the assignments and submit your orignal source code.

Programming

- SOP Input Format:
  - n : Number of variables (1-32)
  - ###..## = n-size Array of {‘0’,’1’,’-’}
    - 0 : Zero
    - 1 : One
    - - : Unspecified
- Minterm Output Format
  - Individually Listed Terms
  - Let K=Number of unspecified terms
  - 2^k elements of n-size Array of {‘0’,’1’}

– Example
- Input

```
8
1110-0--
```

- Output

```
11100000
11100001
11100010
11100011
11101000
11101001
11101010
11101011
```


Helpful Data Structure

```
class sop_term {
 public:
   unsigned int value; // up to 32-bits: 0=false, 1=true
   unsigned int mask;  // up to 32-bits: 0=Care,  1=DontCare
};
```

- Example
  - **N=5**
  - **Input = 10-0-**
  - **Value = 10101**
  - **Mask = 00101**

Bit-wise Operators

- The following C/C++ operators may be helpful:
  - Logical left shift
    - Value << bits
  - Logical right shift
    - Value >> bits
  - Bit-wise AND
    - X & Y [Note that && is for logical AND]
  - Bit-wise OR
    - X | Y [Note that || is for local OR]

Methods (Example)

```
#define MaxLineSize 200

int n; // Number of variables in function
char linebuffer[MaxLineSize]; // Buffer to hold input

class sop_term {
  public:
    unsigned int value; // up to 32-bits: 0=false, 1=true
    unsigned int mask;  // up to 32-bits: 0=Care,  1=DontCare
  public:
    int  sop_term::read_value();
    void sop_term::display_var(int i);
    void sop_term::display();
    void sop_term::display_minterms();
};
```

Methods to Read in Data Values

```
int sop_term::read_value(){
  int i;
  int read_error=0;

  value=0;
  mask =0;

  scanf("%s\n",&linebuffer);

  // Read ASCII input, covert to value, mask
  // for bits 0..n-1
 …
}
```