

COE 205 Computer Organization & Assembly Language – Fall 2006

Assignment 6: Displaying the Date and Prime Number Generation

Professor: Muhamed Mudawar

Due Date: Saturday, December 9, 2006

Q1. (12 pts) Write an assembly language program to read a 4-digit hexadecimal number from the user, representing a **date stamp** and output the corresponding date in a readable format. The format of the date stamp is as follows:

0 0 1 1 0 0 1 1 1 0 0 0 0 0 1 1
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 year month day

The least significant 5 bits represent the day number, the next 4 bits represent the month number, and the most significant 7 bits represent the year number relative to 1980. Thus, the above day number is 3, the month number is 12 (December), and the year number is $25 + 1980 = 2005$. The above date should be displayed as 3-DEC-2005. Here is a sample run:

```
Enter date stamp as 4 hex digits: 3383
Date is: 3-DEC-2005
Repeat program (Y/N)? n
```

Read the input character by character as in the first question and filter the keyboard so that it does not accept an invalid character as input. Validate the day number and the month number after reading them. Day 0 and months 0, 13, 14, and 15 should not be accepted, and an error message: **INVALID DATE** should be displayed. The following month names should be used (JAN=1, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC=12).

Check whether the day number is out of range for a given month. For example, there are exactly 30 days in April (month 4), so April 31 is not allowed. Similarly, you can't have more than 29 days in February (month 2), so February 30 and 31 are not allowed. The month of February is typically 28 days, but can be 29 days in a leap year. A leap year is a year divisible by 4, so 1980 is a leap year, but 1981 is not. So, February 29, 1980 is allowed, but February 29, 1981 is NOT allowed. Check whether the day number is out of range for February.

Bonus = 2 pts (Compute the weekday from the date)

1-JAN-1980 is a Tuesday and can be displayed as TUE 1-JAN-1980. Given a valid date, compute and display the weekday from the date. Here, you need to compute the number of days since 1-JAN-1980 and then divide this number by 7 and use the remainder to compute the weekday. If done properly, you should get Saturday for 3-DEC-2005.

Q2. (8 pts) Write an assembly language program to compute and print the first n prime numbers. A number x is prime if no number except 1 and x divides it evenly. A sample run should look as follows. Limit the input n to a maximum of 10,000 prime numbers.

```
How many Prime Numbers: 10
Generated Prime Numbers:
2, 3, 5, 7, 11, 13, 17, 19, 23, 29
```

Store the generated prime numbers in an array before displaying them. To test if an integer x is prime, divide x by the prime numbers that were discovered and stored in the array.

Documentation and Grading

Make sure to document your code and make it as readable as possible. 2 points on each question will go to documentation and readability, and 2 points will go to the writing of the code, division into procedures, and parameter passing. The rest will go to correctness. Write your name, your id, the date, the objective, the input, and the output at the beginning of each program.

Submitting Programming Assignments

- Submit **the source and executable files** of all programs in **one ZIP file**. A missing executable file will receive 0 on correctness.
- Name it as **A6-yourID.zip**. **All submissions should be made through Email** on the due date by **11 pm**. Send to:
mudawar@kfupm.edu.sa ; s227524@kfupm.edu.sa
In the subject field, write your name and ID number.
- Late programming assignments will be accepted, but 1 point will be deducted for each late day for a maximum of 5 late days.
- **A program can be submitted ONCE. Multiple submissions are NOT allowed.** So, make sure to test your program fully using many inputs before submitting it. A small programming error might cost you a lot in program correctness. If your program is not running properly, then consider fixing it and submitting it late by one day losing only 1 point of the grade rather than submitting it incorrectly and losing many points on correctness.
- **Cheating on programming assignments will NOT be tolerated.** All detected cheating cases will receive zeros, including those students who made the effort and wrote the program. So, make sure that you do NOT give a copy of your program to your friends, because then you might lose your mark.