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Electrical Engineering and Information Technology, B.Eng.
Introduction to the C Programming Language: Exercises

Exercise Sheet 3

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1. Exercise. Define an unsigned char c.

- Bits in a char are counted from right to left, from 0 to 7.
  Initialize c with 0.
  Set bit 4, output c with %x.
  Set bit 1, output c with %x.
  Set bit 0, output c with %x.
  Set bit 7, output c with %x.

- Initialize c with 0xFF.
  Delete bit 7, output c with %x.
  Delete bit 6, output c with %x.
  Delete bit 0, output c with %x.
  Delete bit 1, output c with %x.

- Initialize c with 0xFF. Shift c 4 bits to right, output c with %x.
  Initialize c with 0xFF. Shift c 8 bits to right, output c with %x.
  Initialize c with 0xFF. Shift c 4 bits to left, output c with %x.
  Initialize c with 0xFF. Shift c 8 bits to left, output c with %x.

- Define a char sc.
  Initialize sc with 0xFF. Shift sc 4 bits to right, output sc with %x.
  Initialize sc with 0xFF. Shift sc 8 bits to right, output sc with %x.
  Initialize sc with 0xFF. Shift sc 4 bits to left, output sc with %x.
  Initialize sc with 0xFF. Shift sc 8 bits to left, output sc with %x.

  Use printf(“sc = %x\n“, sc & 0xFF);
  Without the masking printf might extend your char sc with 6 more hex digits f to the left of your sc-value.

2. Exercise. a) Write a program, that reads a character from the keyboard, checks whether bit 0 is set and prints the result, then checks whether bit 3 is set and prints the result and finally prints the read character with %x.

   b) Write a program, that defines an unsigned char lcr_reg and we assume that lcr_reg contains the present parameter setting of the line control register for the COM 1.
   Now set the bits in lcr_reg so that the COM 1 parameters are set to word length 8 bit, 1 stop bit and odd parity. We don’t care about the other bits.

   c) Write a program, that defines an unsigned char lsr_reg and we assume that lsr_reg contains the bits of the line status register of the COM 1. Initialize lsr_reg with 0x64 and check whether the parity error bit is set and whether the framing error bit is set and print the result to the screen.

3. Exercise. a) Define a float variable f and an int variable i. Set a float value for f, make a cast to int

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   i = (int) f;
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   and print the value of i to the screen.
   Test your program with setting f to 7.1 and setting f to 7.8. Is there a difference in the output?

   b) Try to force rounding, if you cast from float to int.

4. Exercise. Read a text mixed with upper case letters and lower case letters into a char array, use lower() from E.2-5 to convert to lower case letters and print the resulting array to the screen.
   Read a second text into a second char array and append the second text to the first text using strcat() frm E.2-7. Print the resulting text to the screen.