Jiangxi University of Science and Technology

Ch06 Modularity Using Functions: Part I

Lecture0603 Case Study

6.3 Case Study: Calculating Age Norms

➢ Requirements Specification

- A fairly common procedure in child development is to establish normal ranges for height and weight as they relate to a child's age
- These normal ranges are frequently referred to as age norms
- In this case study, we develop a program for calculating both the expected height of a child between the ages of 6 and 11 and
- the deviation of this height norm to an actual child's height

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- Requirements Specification (continued)

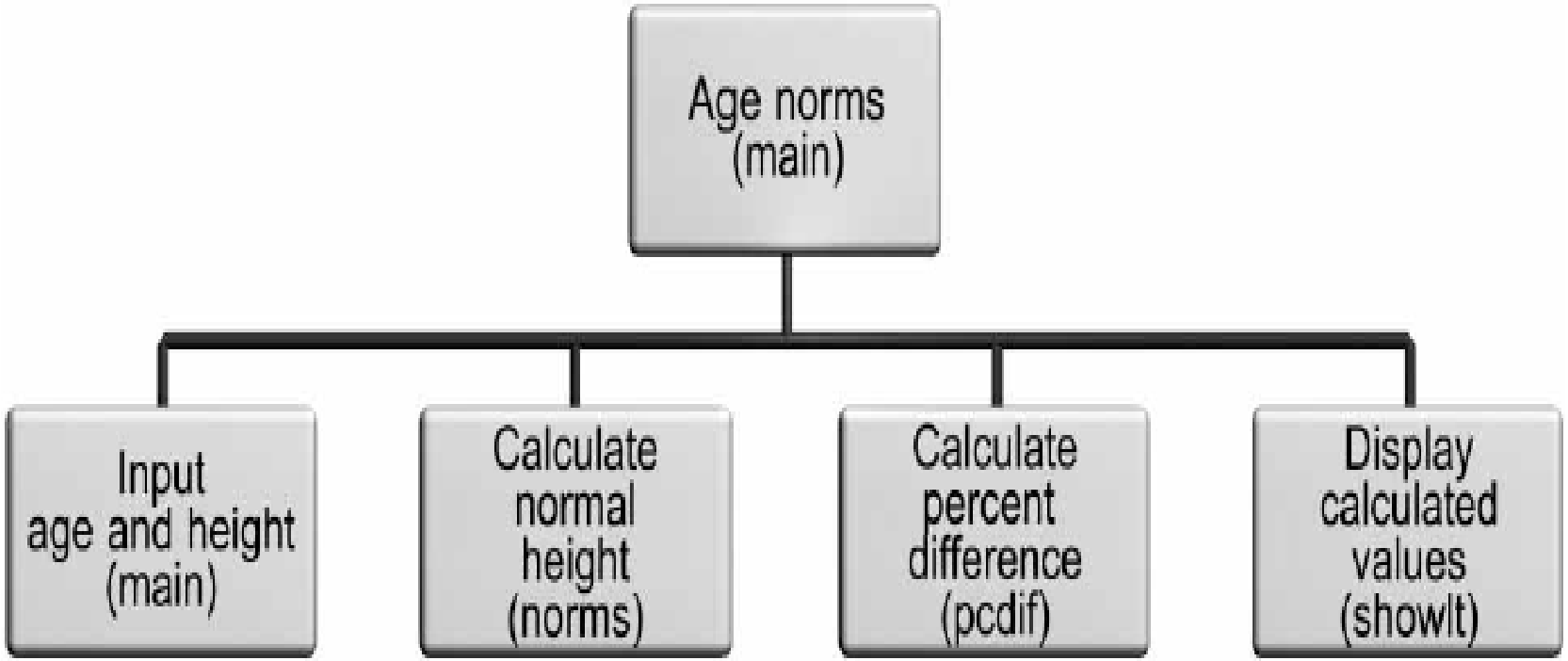

Figure 6.10 Refined structure diagram

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- Program 6.6

```
1.  #include <stdio.h>
2.  #include <math.h>
3.  int main()
4.  {
5.          float norms(float);//the function prototypes
6.          float pcdif(float, float);
7.          void showit(float, float);
8.          int years, months;
9.          float height, normht;
10.         float age, perdif;
```

```
11.     printf("\nHow old (in years) is this child? ");
12.     scanf("%d", &years);
13.     printf("How many months since the child's birthday? ");
14.     scanf("%d", &months);
15.     age = years + months/12.0;  /* convert to total years */
16.     printf("Enter the child's height (in inches): ");
17.     scanf("%f", &height);
19.     /* this is the calculations section */
20.      normht = norms(age);
21.      perdif = pcdif(height, normht);
22.      /* this is the display section */
23.      showit(normht, perdif);
24.      return 0;}
```

```
26.  /* the following is a stub for norms() */
27.  float norms(float age)
28.  {
29.  printf("\nInto norms()\n");
30.  printf("   age = %f\n", age);
31.  return(52.5);
32.  }
```

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```
/*the following is a final function for norms() */
26.  float norm(float age){
27.  #define MINAGE 6.0
28.   float agedif, avght;
29.   agedif = age - MINAGE;
30.   avght=-0.25*pow(agedif,2)+3.5*agedif+45.0;
31.   return (avght);
32.  }
```

```
33.  // the following are stubs for pcdif()  and showit()
34.  float pcdif(float actual, float normal){
35.   printf("\nInto pcdif()\n");
36.   printf("  actual=%f   normal=%f\n", actual, normal);
37.   return(2.5);
38.  }
39.  void showit(float normht, float perdif){
40.    printf("\nInto showit()\n");
41.   printf("normht = %fperdif = %f\n", normht, perdif);
42.  }
```

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```
33.      // the following are stubs for pcdif() and showit()
34.  float pcdif(float actual, float base)
35.  {
36.              return (actual - base)/base * 100.0;
37.  }
38.  void showit(float normht, float perdif){
39.          printf("\nThe average height in inches is: %5.2f\n", normht);
40.          printf("The actual height deviates from the norm by: %6.2f%c\n", perdif, '%');
41.  }
42.  /* the following is a stub for showit() */
43.  void showit(float normht, float perdif)
44.  {
45.     printf("\nInto showit()\n");
46.     printf("   normht = %f      perdif = %f\n", normht, perdif);
47.  }
```

Reference

- BOOK
- Some part of this PPT given by Prof 欧阳城添

(Prof: Chengtian Ouyang)

- with special thank
- https://www.codingunit.com/c-tutorial-first-c-program-hello-world