

Variables

So far, we have discussed three *data types*:

1. integer – positive and negative whole numbers
2. string – combinations of characters and letters
3. real – decimal values

In Turing, the only way we have filled, or assigned, values to variables is using the get command:

```
put "What is your name?"  
get firstName
```

External & Internal Variables

When we use the get command to assign a variable, the information is *external* – the user provides the data directly.

It is often useful to have variables that are used *internally* in the program. As programs become more complicated, it becomes necessary to do extra calculations and store useful information.

Example – Internal Variables

Ask the user to enter 3 numbers and then display the sum and the average:

```
var num1, num2, num3 : int

put "Enter 3 numbers: " ..
get num1, num2, num3

put "The sum is " ..
put (num1+num2+num3) ..
put " and the average is " ..
put (num1+num2+num3)/3
```

Example – Internal Variables

```
var num1, num2, num3, sum : int
var average : real
```

```
put "Enter 3 numbers: " ..
get num1, num2, num3
```

```
sum := num1 + num2 + num3
average := sum/3
```

```
put "The sum is " ..
put sum ..
put " and the average is " ..
put average
```

Internal Variables

With simple problems, the extra variables may be unnecessary. In fact, they may require more work.

As the problems become more complex, however, the use of extra variables will help you store and reuse important data later in the program.

We have introduced the assignment operator, which allows us to assign a value to a variable without a get (input) statement.

Assigning Values to Variables

```
var message : string  
var num1, num2 : int  
var average : real
```

%values can be given an initial value

```
message := "Please enter two values: "
```

%values can be assigned with user input

```
put message ..  
get num1, num2
```

%values can be assigned by using other variables

```
average := (num1 + num2)/2
```

Assignment #1 – due Thursday

Write a program that asks the user for their first name, last name, 4 marks from last semester, and their total number of credits. The inputs for first and last name must be separate.

Respond to the user by their full name, and provide the following output:

1. Their average for last semester as a percent and as a letter grade (A, B, C, D, F).
2. Whether they qualify for the “honour roll”, which requires all marks to be A's.
3. Students require 30 credits to graduate. Inform the user if they might be eligible this year.

Assignment #1

Don't forget:

use comments

1. to put your name, date, and course at the top of the program
2. include a brief description of what the program does
3. to explain your design throughout the program

use proper indentation for if-then-else statements

pay attention to formatting and the quality of your interaction with the user, both in asking for input and giving output