LabVIEW Lecture 1

Ertugrul Karademir
What is LabVIEW?

• Graphical programming environment
• Measurement, testing, control applications
• Hardware control
• Flowchart representation
• Object Oriented Approach
What is LabVIEW?
What is LabVIEW?
Virtual Instrument

- LabVIEW programming paradigm
  1. Program control with a front panel
  2. Algorithm with block diagram

- Easy to debug
- Hard to program
Front Panel

View > Controls Palette
Block Diagram

View > Functions Palette
Front Panel – Block Diagram

• To toggle between two panels

Ctrl + E
Context Help

Ctrl + H
Detailed help

To Byte Integer

Converts a number to an 8-bit integer in the range -128 to 127.

The connector pane displays the default data types for this polymorphic function.

**Details**

```
number
```

Place on the block diagram Find on the Functions palette

**number** can be a scalar number, array or cluster of numbers, array of clusters of numbers, and so on.

8-bit integer is of the same data type structure as number.

**To Byte Integer Details**

This function rounds all floating-point numeric values to the nearest integer. If the fractional part of the floating-point value is .5, the function rounds the value to the nearest even integer. For example, the function rounds 13.5 to 14 and rounds 14.5 to 14.

Submit feedback on this topic
Three fashions of variables

- Mixture of GUI and console
  1. Controls
     - User input (In Java: TextBox GUI Component)
  2. Indicators
     - Program output (In Java: Label GUI Component)
  3. Constants
     - Predefined constants (In Java: Class variables with `const` definer)
Controls

- Selected from Controls Palette
- Usually Express Palette is enough
Controls
Controls

• Each control has a proxy in the Block diagram
• Note that proxy has only OUTPUT node
Indicators

- Also Selected from Controls Palette
- Usually Express Palette is enough
Indicators
Indicators

• Each indicator also has a proxy in the Block diagram
• Note that proxy has only INPUT node
Constants

• You can use functions palette to insert constants
Constants

• Constants only live in Block diagram
Search

- You can always search for the item
- Click on the search button on the palettes
Types

• All standard types are present
  – Integer (signed, unsigned, long, word, byte, quad)
  – Floating point (single precision, double precision, extended precision)
  – Boolean
  – String

• All of above can be arranged in arrays, matrices, clusters
Flow Chart Paradigm

- Flow of execution is done by following nodes in a flow diagram

LEVEL 1

NODE  

LEVEL 2

NODE

And so on...
Wiring

• Defines the direction of flow
Wiring

- One to many connection is acceptable
- Many to one connection is illegal
Wiring

- Application of algorithm is done by wiring
- Color of the wire indicates type
  - Blue: Integer, Orange: Floating Point
  - Purple: String, Green: Boolean

Red dot indicates that “wrong type has wired but it’s OK, he has made the type-casting”.
Algorithm Construction

All algorithm structures lies in Programming Sub-Palette
Algorithm Construction

Program flow structures are under Structures Sub-sub-palette
Program Control

RUN

PAUSE

STOP

CONTINUOUSLY

RUN
Debugging

[Diagram of a software interface with arrows pointing to buttons labeled 'HIGHLIGHT' and 'EXECUTION']
Debugging

- Broken Arrow Means ERROR
- Click to see Error List
Program Flow Control

• For loops
• While loops
• Sequences
  – Flat sequence
  – Stacked sequence
• And many more
• Compansates for: Event handling, Top-to-bottom execution, OOP, etc.
For loop

- Loop for limited iterations
- Must know the iteration amount before-hand
- Loop count can-not be change once set
For loop

Another way to create variables: Right clicking onto the node
For loop example

• Get some number from the user
• Add 3 to it 10 times
• Display the result
For loop example
For loop example

Shift registers convey result of one iteration to the next iteration
For loop example
For loop example

Do not limit your imagination
For loop example

User only interacts with three objects
While loop

• Loops until the loop condition is satisfied
• Or while the loop condition is not satisfied
  • Select by clicking on the loop condition
While loop example
While loop example

Employ boolean and comparison palette controls to manage loop condition
While loop example
Flat sequence

Executes contents of each frame one by one
Flat sequence
Flat sequence