

Control Structures: Selection

*CE 311 K - Introduction to Computer
Methods*

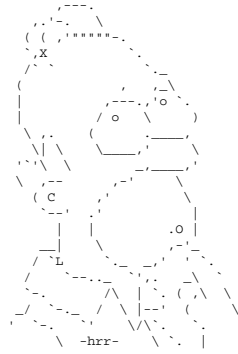
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Introduction

- ASCII (ANSI) Character Set
- Relational Operators
- Logical Operators
- Program Control – Selection
 - If/Then, If/Else/Then, ...

ASCII Characters

- All info is stored in the computer as strings of 0's and 1's
- Each character is coded to a binary value
- ASCII (American Standard Code for Information Interchange)
- Codes 33 to 126, represent letters, digits, punctuation marks, and a few miscellaneous symbols



<http://www.chris.com/ASCII/>

ASCII Character Set

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00	Null	32	20	Space	64	40	@	96	60	`
1	01	Start of heading	33	21	!	65	41	A	97	61	a
2	02	Start of text	34	22	"	66	42	B	98	62	b
3	03	End of text	35	23	#	67	43	C	99	63	c
4	04	End of transmit	36	24	\$	68	44	D	100	64	d
5	05	Enquiry	37	25	%	69	45	E	101	65	e
6	06	Acknowledge	38	26	&	70	46	F	102	66	f
7	07	Audible bell	39	27	'	71	47	G	103	67	g
8	08	Backspace	40	28	(	72	48	H	104	68	h
9	09	Horizontal tab	41	29	)	73	49	I	105	69	i
10	0A	Line feed	42	2A	*	74	4A	J	106	6A	j
11	0B	Vertical tab	43	2B	+	75	4B	K	107	6B	k
12	0C	Form feed	44	2C	,	76	4C	L	108	6C	l
13	0D	Carriage return	45	2D	-	77	4D	M	109	6D	m
14	0E	Shift out	46	2E	.	78	4E	N	110	6E	n
15	0F	Shift in	47	2F	/	79	4F	O	111	6F	o
16	10	Data link escape	48	30	0	80	50	P	112	70	p
17	11	Device control 1	49	31	1	81	51	Q	113	71	q
18	12	Device control 2	50	32	2	82	52	R	114	72	r
19	13	Device control 3	51	33	3	83	53	S	115	73	s
20	14	Device control 4	52	34	4	84	54	T	116	74	t
21	15	Neg. acknowledge	53	35	5	85	55	U	117	75	u
22	16	Synchronous idle	54	36	6	86	56	V	118	76	v
23	17	End trans. block	55	37	7	87	57	W	119	77	w
24	18	Cancel	56	38	8	88	58	X	120	78	x
25	19	End of medium	57	39	9	89	59	Y	121	79	y
26	1A	Substitution	58	3A	:	90	5A	Z	122	7A	z
27	1B	Escape	59	3B	;	91	5B	[	123	7B	{
28	1C	File separator	60	3C	<	92	5C	\	124	7C	|
29	1D	Group separator	61	3D	=	93	5D	]	125	7D	}
30	1E	Record separator	62	3E	>	94	5E	^	126	7E	~
31	1F	Unit separator	63	3F	?	95	5F		127	7F	□

ASCII Character Set

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1	01	Start of heading	33	21	!	65	41	A	97	61	a
2	02	Start of text	34	22	"	66	42	B	98	62	b
3	03	End of text	35	23	#	67	43	C	99	63	c

- $\text{Chr}(n)$ = character with ASCII value n ($0 < n < 255$)
- $\text{Asc}(str)$ = ASCII value of the first character of str
- `TextBox1.Text = Chr(65)` displays "A"
- `ListBox1.Items.Add(Asc("Apple"))` displays 65

Relational Operators

- = equal to
 - <> not equal to
 - < less than
 - > greater than
 - <= less than equal to
 - >= greater than equal to
- All relational operators have equal precedence and are evaluated left to right

Example - Relational Operators

True or false?

$1 \leq 1$

$1 < 1$

"car" < "cat"

"Dog" < "dog"

<u>Expression</u>	<u>Result</u>
$5 = 1$	0 (false)
$5 > 1$	1 (true)
$5 \lt;> 1$	1 (true)
$5 + 10 = 3 * 5$	1 (true)

Logical Operators

Operator	Description	Example	Result
And	Both sides must be true	T And T F And T	T F
Or	One side or other must be true	T Or T F Or T	T T
Not	Negates truth	Not (T)	F

Logical Operators

A	not A	B	not B	A and B	A or B
F	T	F	T	F	F
F	T	T	F	F	T
T	F	F	T	F	T
T	F	T	F	T	T

Examples

Suppose: $n = 4$ and $ans = "Y"$

True or False?

1. $(2 < n) \text{ AND } (n < 6)$
2. $(ans < n) \text{ OR } (n = 6)$
3. $\text{NOT } (n < 6)$
4. $(ans = "Y") \text{ OR } (ans = "y")$
5. $\text{NOT } (ans = "y")$
6. $((ans < n) \text{ AND } (n = 7)) \text{ OR } (ans = "Y")$
7. $(n - 2) \text{ AND } ((n = 7) \text{ OR } (ans = "y"))$

Order of Operations

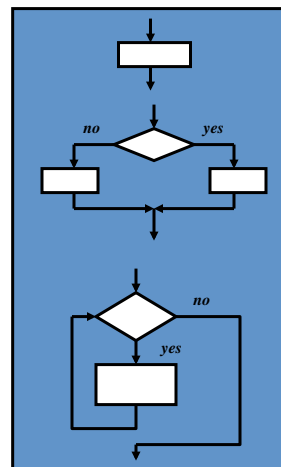
1. Parentheses
2. \wedge
3. * / \ MOD
4. + -
5. NOT
6. AND
7. OR

$3 * 5 > 8 * 2$ OR $6 * 7 < 100 - 5 \wedge 2$

T or F?

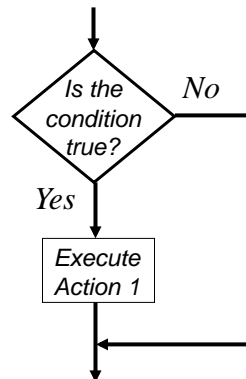
Program Control

- Sequence
- Selection
- Repetition



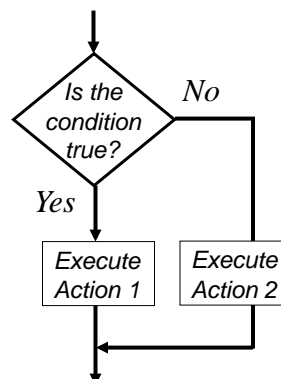
Selection: If – Then

If *condition* Then
 Action 1
End If



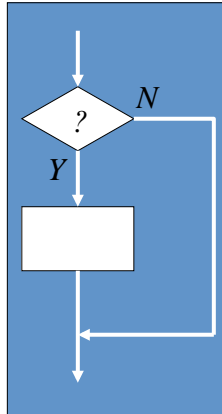
Selection: If – Then – Else

If *condition* Then
 Action 1
Else
 Action 2
End If

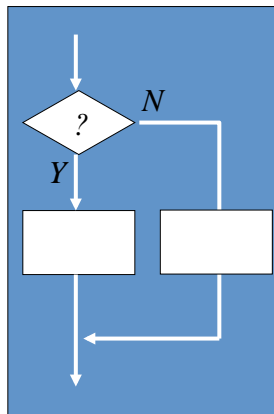


Selection: If – Then (variations)

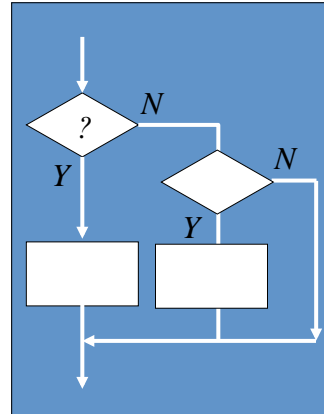
If – Then



If – Then - Else

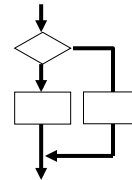


If – Then - Elseif



Example

- Find the larger of two numbers input by a user

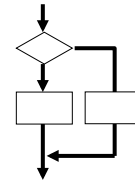


```

Private Sub Button1_Click(ByVal sender As System.O
    Dim num1, num2, large As Double
    num1 = Cdbl(TextBox1.Text)
    num2 = Cdbl(TextBox2.Text)
    If num1 > num2 Then
        large = num1
    Else
        large = num2
    End If
    TextBox3.Text = "Larger number = " & large
End Sub
    
```

Example

- This if block has a logical operator in its condition



Form1

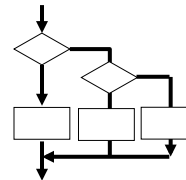
How many gallons does a 10-gallon hat hold?

```

Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles Button1.Click
    Dim answer As Double
    answer = CDb1(TextBox1.Text)
    If (answer >= 0.5) And (answer <= 1) Then
        TextBox2.Text = "Good."
    Else
        TextBox2.Text = "No."
    End If
    TextBox2.Text &= " It holds about 3/4 gallon."
End Sub
                
```

Example

- If the two numbers are equal, the program reports this



```

Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles Button1.Click
    Dim num1, num2 As Double
    num1 = CDb1(TextBox1.Text)
    num2 = CDb1(TextBox2.Text)
    If num1 > num2 Then
        TextBox3.Text = "The large number is: " & num1
    ElseIf num2 > num1 Then
        TextBox3.Text = "The large number is: " & num2
    Else
        TextBox3.Text = "The two numbers are equal."
    End If
End Sub
                
```

Form1

First Number

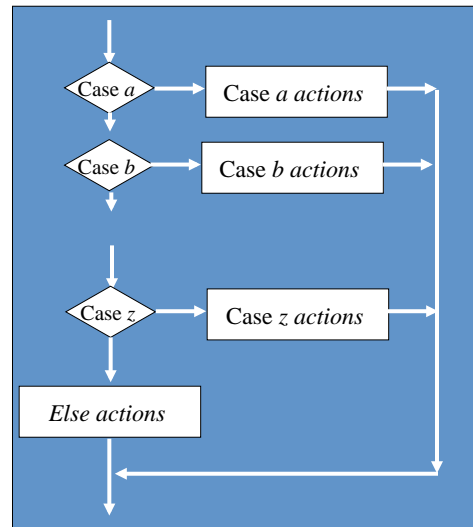
Second Number

Answer

Select Case Statement

Select Case *testExpression*

Case *a*
 statements-a
 Case *b*
 statements-b
 Case *c*
 statements-c
 ...
 Case *z*
 statements-z
 Case *else*
 statements-else
 End Select



Summary

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