**Pointer**

**Basic Concept:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| int x = 10; | |  |  | | --- | --- | | x Value | 10 | | x Memory Address | AAAABBB0 | |
| cout<<x; | Output: 10 |
| cout<<&x; | Output: AAAABBB0 |
|  |  |
| int \*p; | //pointer holds memory address of a variable.  //int pointer holds memory address of an integer variable.   |  |  | | --- | --- | | p Value |  | | p Memory Address | AAAADDDD | |
| p = &x; | |  |  | | --- | --- | | p Value | AAAABBB0 | | p Memory Address | AAAADDDD | |
| cout<<p; | Output: AAAABBB0 |
| cout<<&p; | Output: AAAADDDD |
| cout<<\*p; | Output: 10 |
| int \*\*q; | //Pointer of a pointer.  //q will hold the memory location of another pointer.   |  |  | | --- | --- | | q Value |  | | q Memory Address | BBBBDDDD | |
| q = &p; | |  |  | | --- | --- | | q Value | AAAADDDD | | q Memory Address | BBBBDDDD | |
| cout<<q; | Output: AAAADDDD |
| cout<<&q; | Output: BBBBDDDD |
| cout<<\*q; | Output: AAAABBB0 |
| cout<<\*\*q; | Output: 10 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x, \*p, \*\*q |  | p, \*q |  | q |

|  |  |
| --- | --- |
| x | 10 |
| AAAABBB0 | |

|  |  |
| --- | --- |
| q | AAAADDDD |
| BBBBDDDD | |

|  |  |
| --- | --- |
| p | AAAABBB0 |
| AAAADDDD | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| &x, p, \*q |  | &p, q |  | &q |

**Multiple Pointer to Same variable:**

|  |  |
| --- | --- |
| x | 31 |
| AAAABBB0 | |

|  |  |
| --- | --- |
| p | AAAABBB0 |
| AAAADDDD | |

|  |  |
| --- | --- |
| q | AAAABBB0 |
| BBBBDDDD | |

int x = 10;

int \*p = &x;

int \*q = &x;

|  |  |
| --- | --- |
| x = 20; |  |
| cout<<x<<endl; | 20 |
| cout<<\*p | 20 |
| cout<<\*q | 20 |
| \*p = 30 |  |
| cout<<\*p | 30 |
| cout<<\*q | 30 |
| (\*q)++ |  |
| cout<<\*p | 31 |

**Array using Pointer**

int arr[10];

int \*a;

a = &arr[0];

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 12 | 25 | 9 | 2 | 22 | 23 | 140 | 180 | 30 | 194 |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1-4 | 5-8 | 9-12 | 13-16 | 17-20 | 21-24 | 25-28 | 29-32 | 33-36 | 37-40 |

|  |  |
| --- | --- |
| cout<<arr[0]<<endl; | 12 |
| cout<<\*a<<endl; | 12 |
| cout<<\*(a+1)<<endl; | 25 |
| cout<<\*(a+5)<<endl; | 23 |

**Passing Pointer inside function**

int x = 10;

int y = 20;

swap(x,y); //pass by value

swap(&x, &y); //pass by reference

**Returning Pointer from function**

int \*add(int x, int y);

{

int r = x+y;

return &r;

}

int main( )

{

int x = 10;

int y = 20;

int \*z = add(x,y);

}