**Language Map for C#**

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| **Variable Declaration**  *Is this language strongly typed or dynamically typed? Provide at least three examples (with different data types or keywords) of how variables are declared in this language.* | Strongly typed  Examples:  string name = “Kory”  isApplicable = true  int Number = 22 |
| **Data Types**  *List all of the data types (and ranges) supported by this language.* | Value: short, int, char, float, double  Reference: String, Class, Object, Interface  Booleans  Pointer |
| **Selection Structures**  *Provide examples of all selection structures supported by this language (if, if else, etc.)* ***Don’t just list them, show code samples of how each would look in a real program.*** | If Statement:  if(condition){  //code to be executed}  If-else Statement:  if(condition){  // code if condition is true}  else {  // code if condition is false}  If-else-if ladder Statement:  if(condition1){  // code to be executed if condition1 is true}  else if(condition2){  // code to be executed if condition2 is true}  else if(condition3){  // code to be executed if condition3 is true}  else{  // code to be executed if all the conditions are false}  Nested If Statement:  if (condition1) {  // code to be executed  // if condition2 is true  if (condition2){  // code to be executed  // if condition2 is true}  }  Switch Statement:  switch (expression) {  case value1: // statement sequence  break;  case value2: // statement sequence  break;  case valueN: // statement sequence  break;  default: // default statement sequence  }  Nested Switch Statement |
| **Repetition Structures**  *Provide examples of all repetition structures supported by this language (loops, etc.)* ***Don’t just list them, show code samples of how each would look in a real program.*** | While Loop:  while (boolean condition){  loop statement}  For loop:  for (loop variable initialization ; testing condition; increment / decrement){   // statements to be executed}  Controlled Loops-  Do-while Loop:  do{  statements  }while (condition);  Infinite loop:  For(;;)  Console.WriteLine}  Nested Loop:  for(int i=1; i<2;i++)  for(int k=1;k<3;k++)  Console.WriteLine;}  Continue Statement:  for(int i=1; i<2;i++){  if(i==2)  continue;  Console.WriteLine;} |
| **Arrays**  *If this language supports arrays, provide* ***at least two examples*** *of creating an array with a primitive or String data types (e.g. float, int, String, etc.) If the language supports declaring arrays in multiple ways, provide an example of way.* | String:  string[] weekDays;          weekDays = new string[] {"Sun", "Mon", "Tue", "Wed",                                         "Thu", "Fri", "Sat"};          foreach(string day in weekDays)              Console.Write(day + " ");  Integer:  int [] n = newint[10];  int i,j;  for ( i = 0; i < 10; i++ ) {  n[ i ] = i + 100;  }  for (j = 0; j < 10; j++ ) {  Console.WriteLine("Element[{0}] = {1}", j, n[j]);  }  Multi-dimensional:  int[, ] intarray = new int[4, 2];  Console.WriteLine("2DArray[0][0] : " + intarray[0, 0]); |
| **Data Structures**  *If this language provides a standard set of data structures, provide a list of the data structures and their Big-Oh complexity (identify what the complexity represents).* | Stack – O(n) – Linear time. Number of operations is proportional to the growth of items.  Queue – O(n) - Linear time. Number of operations is proportional to the growth of items.  Linked List – O(n) - Linear time. Number of operations is proportional to the growth of items.  Hashtable – O(1) - Constant time. No growth in operations  Binary Search – O(logn) – Does not grow based on input data as each step reduces search space by half  Binary Search Tree – O(logn) - Logarithmic time because the growth of operations is smaller than the number of items  Graphs - O(1) – Constant time. No growth in operations  Sorting Algorithms – O(logn) – Logarithmic time because the growth of operations is smaller than the number of items |
| **Objects**  *If this language support object-orientation, provide an example of how you would write a simple object with a default constructor and then how you would instantiate it.* | namespace ConsoleApplication3{  classPr{  int num;  string name;  // this would be invoked while the  // object of that class created.  Pr(){  Console.WriteLine("Constructor Called");  }  staticvoid Main(string[] args) {  Pr p = newPr();  Console.WriteLine(p.name);  Console.WriteLine(p.num);  Console.ReadLine();  }  }  } |
| **Runtime Environment**  *What runtime environment does this language compile to? For example, Java compiles to the Java Virtual Machine.*  *Do other languages also compile to this runtime? If so, what these other languages?* | C# programs are executed by the .NET Core runtime environment.  .NET Core can compile c#, VB.NET, and F#. |
| **Libraries/Frameworks**  *What are the popular libraries or frameworks used by programmers for this language? List at least three (3) and describe what they are used for.* | 1) ASP.NET Core is used for building web applications including APIs and web UIs for building dynamic web pages and dependency injections for managing application components.  2) Dapper is used for efficient database interaction. It is an object-relational mapping library that simplifies database access by allowing developers to write SQL queries directly and automatically map results to C# objects.  3) xUnit.net is for unit testing that provides a flexible and extensible way to write and run unit tests for C# applications with features like data-driven testing and test attributes. |
| **Domains**  *What industries or domains use this programming language? Provide at least three specific examples of companies that use this language and what they use it for****. E.g. Company X uses C# for its line of business applications.*** | C# is primarily used in software development for building web applications, desktop applications, mobile apps, and games.  Microsoft uses C# for developing its Windows OS, Office suite, Azure cloud platform and various other software applications.  Stack Overflow uses C# for app development and web services.  Hospital systems such as BJC Healthcare use C# for developing patient management systems, electronic health records, and medical imaging software. |