Question 1: Dalvik Virtual Machine (DVM) instructions

1. **Opcode**: 09 32x

**Mnemonic**: move-object/16 vv, vy

**Arguments**: A: destination register (16 bits) & B: source register (16 bits)

**Description**: Moves the object reference from vy to vx.

**Example:** 0781 - move-object v1, v8  
Moves the object reference in v8 to v1.

1. **Opcode:** 0f 11x

**Mnemonic:** return vAA

**Arguments:** A: return value register (8 bits)

**Description:** Return from a single-width (32-bit) non-object value-returning method.

**Example:** 0F00 - return v0  
Returns with return value in v0.

1. **Opcode**:23 22c

**Mnemonic**: new-array vA, vB, type@CCCC

**Arguments:** A: destination register (8 bits), B: size register & C: type index

**Description:** Generates a new array of type\_id type and vy element size and puts the reference to the array into vx

**Example:** 2312 2500 - new-array v2, v1, char[] // type@0025  
Generates a new array of type@0025 type and v1 size and puts the reference to the new array into v2.

1. **Opcode:** 1d 11x

**Mnemonic:** monitor-enter vAA

**Arguments:** A: reference-bearing register (8 bits)

**Description:** Acquire the monitor for the indicated object.

**Example:** 1D03 - monitor-enter v3  
Obtains the monitor of the object referenced by v3.

1. **Opcode:** 21 12x

**Mnemonic:** array-length vA, vB

**Arguments:** A: destination register (4 bits) & B: array reference-bearing register (4 bits)

**Description:** Calculates the number of elements of the array referenced by vA and puts the length value into vB.

**Example:** 2111 - array-length v1, v1  
Calculates the number of elements of the array referenced by v1 and puts the result into v1.

**Question 2: Difference between mobile computing & cloud computing**

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| **Mobile Computing** | **Cloud Computing** |
| Mobile computing is human–computer interaction by which a computer is expected to be transported during normal usage | Cloud computing refers to network-based services, which appear to be provided by real server hardware, and are in fact served up by virtual hardware, simulated by software running on one or more real machines |
| Involves doing the required computation using the mobile device such as laptop or mobile phone. | Allows you to store your files and folders in a “cloud” area on the Internet, allowing you access to all of your files and folders wherever you are in the world |
| Always involves a physical device | There is no physical device involved. |
| The computing is done on the hardware | The computing is done on simulated software |

**Question 3: An example of an application simulating an environment of  context- aware computing**

A mobile application which can guide the driver which route to take depending upon his starting location, target destination and the current traffic location.

There might be multiple routes between two locations. The shortest route may always not be the best route in terms of time taken for the journey. If the shortest route it fret with traffic, it’s always advisable to take the longer less busy route to reach the destination.

The traffic condition on different road is different at different points of time. It is constantly changing. Thus, depending upon the traffic conditions on all the routes from the source and destination, the best route has to be suggested.

There might be a traffic jam all of a sudden in the path the driver has taken, then the application should immediately detect such a jam and give him an alternative route so that he reaches his destination faster, thus saving his precious time.

This is a context aware computing application because, it depends on the driver’s current location (GPS could be used), and his surrounding environment (traffic condition). Thus the context of the driver (i.e., his mobile phone) can be used effectively to guide him towards the faster route.