GIN204 - Systèmes cloudifiés

Contrôle de connaissances

(# Questions : 16)

Les documents sont interdits. L'ordinateur portable est autorisé.
Durée : 1h30
Indiquez vos nom et prénom ci-dessous puis répondez aux questions suivantes.

Nom : DUCK
Prénom : Donald
Groupe : KH1

Multiple choice

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1. What is the feature of Cloud services that allows to dynamically adapt to a workload variation, thus allowing to manage computing infrastructure better and more efficiently ?

   - ☐ Network abstraction
   - ☐ Software switching/routing
   - ☒ Scalability
   - ☐ Cloud-native applications
   - ☐ Not enough data to answer
   - ☐ None of the above

2. Choose the correct(s) statement(s) about cloud services.

   - ☐ Computing services are only charged by-the-hour
   - ☒ Computing services can be charged by the hour or on a subscription-basis
   - ☒ Cloud computing transforms the upfront cost into variable cost
   - ☐ Cloud computing transforms variable costs into upfront costs
   - ☒ Services can be added or reduced as needed
   - ☐ Cloud systems do not offer cost management
   - ☐ None of the above

3. Choose the correct(s) statement(s) about cloud deployments.

   - ☒ Internet connection is required to access a cloud management console
   - ☐ Cloud systems replace native hardware and software
   - ☐ Cloud services are delivered locally
   - ☒ IaaS provides virtual servers for application hosting
   - ☐ A SaaS product requires to install the software before using it
   - ☐ If a FaaS virtual instance is not accessed, it remains active and incur additional costs
   - ☐ None of the above

4. In the Function-as-a-service model, a newly spawned container may experience a delay in execution for the first function call. This is called :

   - [ ] Scale-down
   - [ ] Ghost in the shell
   - [ ] Hard provisioning
   - [x] Cold start
   - [ ] Warm start
   - [ ] There is no execution delay in FaaS model
   - [ ] None of the above

5. What are the services that a cloud system can provide to a customer ?

   - [x] Storage
   - [ ] TCP and UDP protocols
   - [x] Processing
   - [x] Networking
   - [ ] Connection-less access
   - [ ] Hardware components
   - [ ] None of the above

6. Choose the correct(s) statement(s) about the IaaS model.

   - [ ] Applications are hosted by a third party because tenants have no access to the infrastructure
   - [x] The IaaS model provides fully-fledged virtual servers, including networking and storage
   - [ ] IaaS requires large initial investments (upfront costs)
   - [ ] A VPC under the IaaS model requires the guest OS to be the same as the host OS
   - [x] The underlying infrastructure is managed by the cloud provider
   - [ ] None of the above

7. A group of computing resources shared via a single abstract layer is called a :

   - [ ] Hypervisor
   - [x] Cluster
   - [ ] Machine
   - [ ] Blade
   - [ ] Container
   - [ ] Network
   - [ ] None of the above

8. Choose the correct(s) statement(s) about the public/private/hybrid and multi-cloud deployments.

   - [x] Public cloud services are hosted within third party equipment
   - [ ] With hybrid cloud deployments, the tenants' data are safely stored within the owner's computers
   - [ ] Running VMs in a multi-cloud environment is not compatible with cloud-native development
   - [x] Both hybrid and multi-cloud deployments have different components hosted in a public/private environment
   - [x] A private cloud service is not available on public Internet, but only via internal network (LAN or VPN)
   - [x] In a multi-cloud scenario there is usually a private component offloaded to a public cloud in peaks periods
   - [ ] None of the above

9. Choose the correct(s) statement(s) about a Kubernetes pod.

   - [ ] A single pod corresponds to a single container
   - [x] A pod is the smallest unit of work in Kubernetes
   - [x] A pod is ephemeral
   - [ ] A pod can have a single label to help identify its type
   - [x] A pod can have multiple replicas by configuring a ReplicaSet
   - [ ] None of the above

10. Choose the correct(s) statement(s) about the following Kubernetes yaml file.

```yaml
apiVersion: v1
kind: Deployment
metadata:
  name: my-deployment
  labels:
    app: web
spec:
  replicas: 5
  template:
    metadata:
      labels:
        app: web
    spec:
      containers:
       -name: ubuntu
          image: nginx
          ports:
           -containerPort: 80
```

   - [ ] This yaml will create a pod from the image `my-deployment`
   - [ ] This yaml will create a pod with 5 replicas from the image `ubuntu`
   - [x] This yaml will create a pod with 5 replicas from the image `nginx`
   - [ ] This yaml will ensure that there will be at least 5 pod replicas
   - [ ] This yaml will ensure that there will be at most 5 pod replicas
   - [x] This yaml will ensure that there will be exactly 5 pod replicas
   - [ ] By changing the number of replicas, all existing instances must be removed before instantiating the new ones
   - [ ] None of the above

11. Put the following steps in the correct order (1 to 8) in case of the creation of a Docker container from a registry and the execution of some code.

1 ☐ On the client, run `docker pull` and specify the desired image and the registry
5 ☐ If the image is available on the registry, it is downloaded locally on the client
7 ☐ On the client, run `docker run` and specify the desired command parameters
3 ☐ The Docker daemon will contact the Docker hub registry, if no other registry is specified
6 ☐ The Docker daemon will build a container from the specified image
8 ☐ On the client, run `docker attach` and execute the desired command
2 ☐ On the Docker host, the Docker daemon will check if an image is stored locally
4 ☐ The Docker daemon will contact the specified registry

12. Choose the correct(s) statement(s) about storage typologies.

☐ In File storage, data is stored into independent chunks
☒ Block volumes can be mounted at OS level or HV level
☒ Locking a block storage must be done on the entire volume
☐ Objects and Files are unstructured and non hierarchical
☒ A File is structured and can be locked individually
☐ None of the above

13. Choose the correct(s) statement(s) about OpenStack projects.

☒ Glance, the image service, stores and manages the VM images
☒ Neutron, the networking service, provides connections between physical NICs and virtual interfaces
☐ Nova, the compute service, manages the storage and the data persistence of VMs
☒ Swift, the object storage service, is not required, but is however suggested
☒ Keystone, the authentication service, is a minimal (required) service
☐ Horizon, the user interface service, is a minimal (required) service
☐ OpenStack services mostly focus on IaaS (i.e., providing VMs)
☐ None of the above

14. *(Bonus seminar question)* Which is the 3rd component, along with consistency and availability, of the CAP theorem :

☐ Erasure Coding
☒ Partition tolerance
☐ Peer 2 Peer
☐ Causal Consistency
☐ Paxos
☐ None of the above

15. Fill in the blanks.
The process called migration identifies the task of moving one VM instance from one physical server to another. This is usually done following events such as failures.
If the process occurs live, then the process is transparent to the user and the instance can keep running.

16. You have been hired by the Bleach® company to design their cloud system due to a growth in their user base. After a preliminary analysis, you have the following elements :
    - 7 different micro-services, all accessible by the same user-base
    - The company has some existing equipment in a private cloud configuration, and may either grow it or find an offloading alternative
    - The services have a peak rate during lunch time, and are rarely used during night time
    - Most of the requested data are privacy-sensitive
    - the user-base is growing

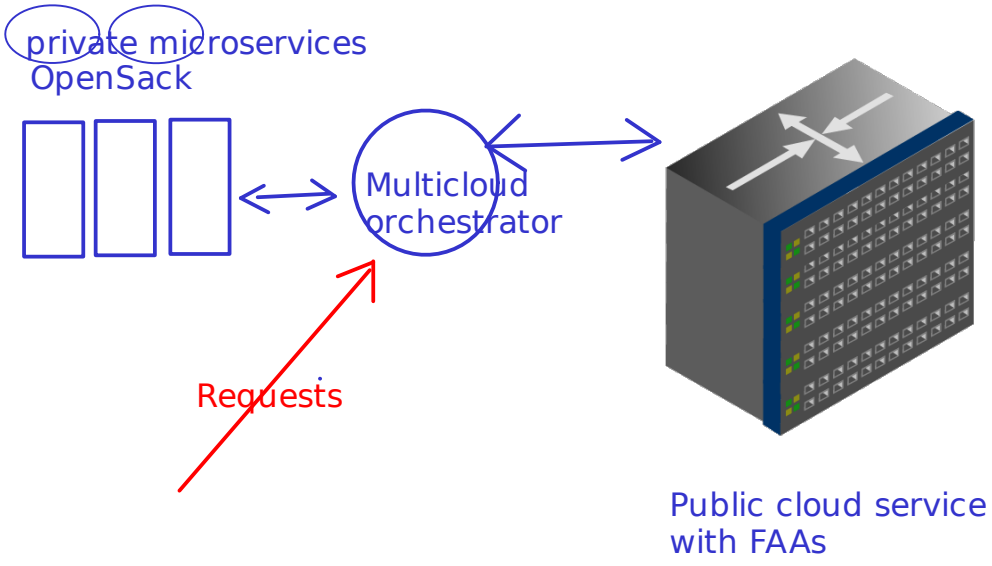
    Design a cloud system that is suitable for their experience. Provide the important design choices that you take into account (E.g., on-premises vs public cloud, XaaS model, VMs or containers, ...) and briefly justify your choices. You can use either French or English to motivate your answer.

The growth of user base suggests to offload compute/storage services to the cloud

The request-data being sensitive, suggests to keep the sensitive services to the existing equipment

Peak-rate during lunch suggests having cost-optimization via a FaaS approach

The proposed architecture is as follows



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