|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | Amazon AWS | Google AppEngine | Microsoft Azure | IBM Smart Business Dev. |
| focus | | Public Cloud | Public Cloud | Public Cloud | Private cloud  Hybrid cloud |
| Infrastructure and virtualization architecture | | Uses XEN Para-Virtualization Architecture | Uses Google Computing Engine as infrastructure for virtualization | Hyper-V virtualization on Azure Compute infrastructure; Fabric controller manages all the VMs | IBM Cloud Computing Reference Architecture is used to create cloud components on cloud data centers |
| Platforms | | IaaS | PaaS | IaaS  PaaS | IaaS |
| Persistent Storage | | CouchDB  Microsoft SQL  MongoDB  MySQL | PostGreSQL | Microsoft SQL  MongoDB  MySQL  Oracle DB | MongoDB  MySQL  PostGreSQL |
| Monitoring | | Amazon Cloud Watch | Google Cloud monitoring console | Azure Management Portal | IBM smart cloud monitoring tool |
| Load Balancing | | **AWS** elastic **load balancing** redirects traffic to healthy  **Amazon** EC2 instances for more consistent application performance | Compute Engine Load Balancing - There are various hardware and software load balancing options available such as DNS level and network level | DNS level - Traffic Manager and the Round Robin load balancing method  Network level - Azure load balancer | Soft Layer Load balancer - use SoftLayer Load Balancing to distribute requests in the IBM Cloud |
| Message Queues | | **Amazon** Simple Queue **Service** (SQS) | Different message queues available:  Push Queues  Pull Queues | Azure Queues and Service Bus queues are implementations of the message queuing service | SoftLayer message queuestreamlines intra-application and inter-system communications |
| Development Tools | | AWS Management Console  AWS Toolkit for Eclipse  AWS Toolkit for Microsoft Visual Studio | Eclipse, Netbeans,  IntellIJ, Maven, Git, Jenkins, PyCharm  Google Web Toolkit (GWT),  GAE SDK for python, Go, PHP, Python | SDKs for .Net, Java, Node.js, PHP, Python, Ruby;  Windows PowerShell;  Azure command-line interface;  AzCopy Command-Line Tool for Azure Storage; | IBM SmartCloud Application Services;  IBM PureApplication Systems;  IBM Workload Deployer;  IBM SmartCloud Provisioning;  IBM Deployment Planning and Automation;  DevOps; |
| Integration with other services | | S3 (Simple Storage Service) and EC2 (Elastic Compute Cloud) integration | Integrate other familiar technologies such as Node.js, C++, Scala, Hadoop, MongoDB, Redis | Integration with many SaaS. BizTalk Services and Hybrid Connections. | Sandbox, CRM |
| Web APIs | | YES | YES | YES | YES |
| Programming Framework | | .NET  Java  PHP  Python  Ruby | Go  Java  PHP  Python | .NET  Java  Node  PHP  Python  Ruby | Java  Node  Ruby |
| Pricing | Machine CPU | 0.14 / hour | $0.10 / hour | $0.12 / hour | $0.10 / hour |
| Storage | $0.25 / GB / month | $0.18 / GB / month | $0.15 / GB / month | $0.15 / GB / month |
| I/O | $0.01 / 1000 requests | $0.02 / 1000 requests | $0.02 / 1000 requests | $0.01 / 1000 requests |
| Bandwidth | $0.10/ GB | 0.10 / Gigabytes / | $0.10/ GB | $0.10/ GB |

Cloud Computing Platforms Comparison

References:

1. Amazon web services: <https://aws.amazon.com>
2. Microsoft Azure: <https://azure.microsoft.com>
3. Google App Engine: [https://**appengine**.**google**.com/](https://appengine.google.com/)
4. IBM cloud: [www.**ibm**.com/**cloud**-computing/us/en/](http://www.ibm.com/cloud-computing/us/en/)