Software Defined Networks Study

In the previous world of networking individual devices such as routers and switches each had a control plane which determined the forwarding tables and treatment of packets of information entering and exiting the device based on layer 3 and/or layer 2 properties determined by an application such as a routing protocol or spanning tree protocol. The distributed nature of this process has become inefficient for the current cloud computing environment.

Software Defined Networks (SDN) is the paradigm shift in the networking world from distributed control planes in individual devices to a centralized controller which communicates with multiple switches defining their individual forwarding tables. The following figure taken from Software Defined Networks A Comprehensive Approach Second Edition by Paul Goransson, Chuck Black, and Timothy Culver illustrate the concept. The applications at the top of the figure would be such processes as routing protocols, Shortest Path Bridging (SPB) etc. These various applications would interface with the central controller which would interface with the network of switches.



Write a report on the genesis of Software Defined Networking being driven by large cloud-based data centers such as Amazon and Google. Address such requirements as listed below:

* Agility: How long does it take for an application request to be fulfilled? An agile data center is one that is able to reduce this time to a minimum.
* Scalability: A data center should be able to house thousands of tenants and several thousand tenant networks. The 4K network limitation imposed by the 12-bit VLAN ID field is not sufficient for supporting large multitenant data centers.
* Elasticity: The ability of a data center to adapt to changing demands and requirements. This may involve the addition of compute workloads, additional storage, and network bandwidth. This must be done without affecting existing application workloads.