

An Architecture for a Fully De-Centralized Peer-to-Peer Volunteer Cloud Computing Infrastructure

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Cloud Computing is becoming more popular everyday, and new application of this paradigm are constantly being discovered. It provides a lot of advantages of an on-premise solution, at a fraction of the cost. But much more than just financial benefits, there are also a lot of different benefits, such as augmented availability, geo-distribution of the assets, augmented reliability, and limitless scalability (theoretically). A new paradigm is emerging from this technology, where it attempts to combine the collaborative nature of Volunteer Computing projects such as SETI@Home and the Cloud Computing infrastructure to build a collaborative Cloud Computing Infrastructure. In this paper we will present the current state of the art of this new paradigm and propose a fully de-centralized peer-to-peer volunteer cloud computing infrastructure. Also, we lay out the map to build a full-fledged cloud computing infrastructure, but only provide a proof of concept implementation for a Platform-as-a-Service infrastructure. A comprehensive study of all the major problems relating to the construction of a collaborative system, and the challenges present when attempting to provide an homogeneous perspective of a set of heterogeneous resources is fundamental. Thus, we are trying to clarify the current misconceptions with respect to the VCC paradigm and generate a tentative ontological representation of it. Leveraging Linux capabilities in terms of virtualization and containers (or operating-system level virtualization), we provide a comprehensive API that encompass the major services necessary from the PaaS level. This API constitute a "barebone", or minimalist, specification of the requirements from a PaaS level and is our second major contribution to the paradigm. This technology aims at giving back the control to the user and liberate them from the oligarchy that governs the cloud computing service providers market. It also aims at recycling the idling resources around the World and to make use of them, by making them available to the World-wide community. Finally, with the current events with regards to whistleblowers and the different information leaking scandals World-wide; there is a concern in terms of security since some corporation considers the user's data as an asset and willingly disclosed them to any party as they wish (under political pressure or not). There is an eminent need to understand that

this information belongs to the user, and thus responsibility should be reverted to the user.