Prototyping Interaction with Reality Cloud based on Virtual GPU Technologies

Real-time depth and image capturing devices have made significant progresses in recent years, rapidly penetrating into individuals and households. Related software and services that provide very rich contents also become popular. As a result, companies start to consider product design and usability from a human-centric perspective. The most successful example is Microsoft's Kinect^{TM}, which instantly brings user intensions back to products and services in use. Such a human-centric interaction technology is considered an emerging trend in industry. Population of the interaction technology requires massive computing resources. To integrate with cloud computing is also mandate. This research proposal presents a collaboration work between Zillians Inc. and NTHU, which complements the development experiences of the company on GPU (Graphic Processing Unit) parallel processing with the research capabilities in 3D interaction, object recognition, and geometric processing of the school. The goal is to develop innovative middleware technologies in "Interaction with Reality Cloud". Through clouds, programmers can easily access complex and massive computing resources involved in their applications driven by interactions with real objects. These clouds own superior parallel processing capability provided by GPU clusters and optimized by GPU virtualization technologies. Software libraries and databases residing at the backend will be constructed according to the computing requirements of various applications. Cloud programming becomes simplified with APIs (Application Program Interfaces) showing through the middleware. This accelerates realization of value-added services driven by innovation. A prototype of Interaction with Reality Cloud will be deployed and two application services in E-commerce and collaborative design will be developed to demonstrate the feasibility of the middleware technologies. The concept of Interaction with Reality Cloud is novel and greatly improves the competiveness of Zillians Inc. Development of the middleware technologies creates a new business model in cloud computing.

Keywords: *Graphic Processing Unit*, *cloud computing*, *interaction with reality*, *depth camera*, *middleware*