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An Allocation Algorithm for
Distributed Gaming in Internet Cafes

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Subject: An Allocation Algorithm for Distributed Gaming in Internet Cafes

Problem: In internet cafes customers pay a per hour rate to use a computer for a variety of tasks such as; web browsing, playing games, and watching videos. These tasks require varying quantities of computing power to run, the computers in the internet cafe must have enough computing power to run the highest requirement task. However in reality most users only require a small portion of that computing power. This produces inefficiency where the computing power available greatly exceeds the average power utilised. In some internet cafes they have multiple zones where each zone has a different task its designed to run. While zoning is an improvement in terms of resource efficiency it creates limitations in that zone sizes are fixed as is the location where the customer can sit. By utilising cloud computing it is possible to replace these computers with server infrastructure that can supply only the computing power demanded by each customer. Like zones this improves efficiency but still allows customers to sit anywhere in the internet cafe, and offers flexibility in the size of the zones.

Using servers as a replacement for computers requires a method by which customers can be allocated computing resources from the servers pool of available resources. This requires an allocation algorithm which determines to which server a customer should be placed and additionally whether the user is worth placing given the resources they will consume. This problem is naturally an online problem as a customer arrives, purchases time on computers, and then uses the resources until they leave. However in order to understand the problem and create

a benchmark for performance an offline algorithm has been developed which given customer arrivals throughout the day, along with tasks demanded and stay duration, will determine if and where to place customers.

Main Results: The Integer Program developed to tackle this scheduling tasks showed improvements in total profit by utilising servers over a zone based model thanks to the additional flexibility in the number of computers supplied for each task type.

Additionally the model shows boosts in the resource efficiency. The per hour percentage utilisation of all resources improves significantly in a server based model when compared to a common two zone internet cafe. This shows that the servers ability to more tightly match the resources demanded by users confers tangible benefits. Further investigation is needed to discover if servers are cost effective compared to computers.

Participants: Students and Researchers at DTU