Seamless Service Migration in Cloud Edge Networks with QUIC

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dc.date.accessioned	2024-09-02T10:39:03Z	
dc.date.available	2024-09-02T10:39:03Z	
dc.date.issued	2023-05-30	
dc.description	Supervised by Prof. Dr. Muhammad Mahbub Alam Co-Supervisor S.M. Sabit Bananee, Lecturer, Department of Computer Science and Engineering(CSE), Islamic University of Technology(IUT), Board Bazar, Gazipur-1704, Bangladesh	en_US
dc.description.abstract	Cloud computing is hoped to replace traditional computing paradigms in the near future, as the Internet becomes a more integral part of our lives, more and more computing resources are being hosted in the cloud. One of the common techniques used by cloud service providers is to migrate cloud-based applications from one server to another for a variety of reasons. This thesis aims to add on the possible strategies of container migration in the cloud using QUIC in an innovative way. The idea is to use a dual-path extension of QUIC to ensure that the user's Quality of Experience is not hampered by the migration of the application hosted in the cloud server. This approach is coined as Dual-path in our thesis. Cloud services are provided via containers that are processes running inside of the servers. Due to a number of conditions such as load balancing, resource balancing, hardware failure or maintenance etc. the container has to be migrated from one server to another. Traditional live migration techniques like Pre-Copy and Post-Copy con sists of three rudimentary phases: iterative push phase, pulling of faulted pages and stop-and-copy (control transfer). During the control transfer phase the cloud service is unavailable and suspended until the container state is fully replicated to another tar get server. This introduces a downtime, hampering the end user's quality of experience. Furthermore, pulling faulted pages involves performance degradation which is not desir able. To mitigate the limitations identified in the traditional live migration techniques, we formulate the dual-path migration scheme. Dual-path migration is an endeavor to redefine live migration techniques where an end user can simultaneously be connected to two servers at any given	en_US

	time. In this approach, once the migration is triggered the end user is dually connected to both the servers capable of requesting and receiving service from any of them. Initially, service is provided to the end user from the source server (traditional single path). Once the migration is triggered the container in the source server does not get suspended like the traditional schemes. Rather it will keep providing service to the end user and the transfer of control will be executed in the background. During this control transfer the end user can request data from any of the two servers. Since the end user is concurrently connected to both servers, the server having the requested data can respond. Once the background migration is completed it will simply terminate connection with the initial server and switch to the target server (again single path). The key attainment in this approach is its negligible downtime and performance upgrade. It also solves synchronization issues between the servers. In this work, we compare and contrast between traditional live migration techniques and our proposed dual-path migration by mathematically analysing post-copy migration using QUIC and dual-path migration, we show that under certain circumstances the dualpath migration scheme performs better than post-copy migration scheme.	
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dc.identifier.uri	http://hdl.handle.net/123456789/2154	
dc.language.iso	en	en_US
dc.publisher	Department of Computer Science and Engineering(CSE), Islamic University of Technology(IUT), Board Bazar, Gazipur-1704, Bangladesh	en_US
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dc.type	Thesis	en_US

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