

Accepted Manuscript

Combining edge and cloud computing for low-power, cost-effective metagenomics analysis

Daniele D'Agostino, Lucia Morganti, Elena Corni, Daniele Cesini, Ivan Merelli



PII: S0167-739X(18)30029-3
DOI: <https://doi.org/10.1016/j.future.2018.07.036>
Reference: FUTURE 4354

To appear in: *Future Generation Computer Systems*

Received date: 4 January 2018
Revised date: 26 April 2018
Accepted date: 17 July 2018

Please cite this article as: D. D'Agostino, L. Morganti, E. Corni, D. Cesini, I. Merelli, Combining edge and cloud computing for low-power, cost-effective metagenomics analysis, *Future Generation Computer Systems* (2018), <https://doi.org/10.1016/j.future.2018.07.036>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Combining Edge and Cloud Computing for Low-Power, Cost-Effective Metagenomics Analysis

Daniele D'Agostino^a, Lucia Morganti^b, Elena Corni^b,
Daniele Cesini^b, Ivan Merelli^c

^a*Institute for Applied Mathematics and Information Technologies "E. Magenes",
National Research Council of Italy, Genoa, Italy*

^b*CNAF Section - Italian Institute for Nuclear Physics, Bologna, Italy*

^c*Institute for Biomedical Technologies, National Research Council of Italy,
Segrate (Milan), Italy*

Abstract

Metagenomic studies are becoming increasingly widespread, yielding important insights into microbial communities covering diverse environments from terrestrial to aquatic ecosystems. This also because genome sequencing is likely to become a routinely and ubiquitous analysis in a near future thanks to a new generation of portable devices, such as the Oxford Nanopore MinION. The main issue is however represented by the huge amount of data produced by these devices, whose management is actually challenging considering the resources required for an efficient data transfer and processing. In this paper we discuss these aspects, and in particular how it is possible to couple Edge and Cloud computing in order to manage the full analysis pipeline. In general, a proper scheduling of the computational services between the data center and smart devices equipped with low-power processors represents an effective solution.

Keywords: Metagenomics; Environmental genomics; Edge computing; Cloud computing; Internet of Things; Internet of Living Things

1. Introduction

Genome sequencing is one of the most effective analysis technique to monitor both the human body, in physiological settings and pathological conditions, as well as the bacterial communities of different environments. Developed in the 1970s with a cost of hundred million dollars, its impressive

Download English Version:

<https://daneshyari.com/en/article/6872768>

Download Persian Version:

<https://daneshyari.com/article/6872768>

[Daneshyari.com](https://daneshyari.com)