

Place Holder*

Subtitle[†]

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Abstract

Text of abstract

Keywords: keyword1, keyword2, keyword3

1 Introduction

Text of paper ...

2 Background and Related Work

Text of paper ...

3 Predicting Foreground Jobs

This section describes how Place Holder predicts the available CPU resources for a pre-specified time t on a machine, given the history of CPU usage for that machine. Such predictions can be passed to the scheduling component of a cluster manager to make decisions whether a job for a certain amount of requested CPU resource should be scheduled on this machine. Instead of point predictions of exactly what the maximum CPU usage will be for next time window t , Place Holder uses prediction intervals to find a safe margin for the point estimate of maximum of CPU usage. There are at least two advantages of using interval predictions; One of them in an obvious way is that the penalty for overestimating the available CPU resources is higher than underestimating the available CPU resources. Irregular behaviours, jumps, and outliers are very common in most maximum traces in Microsoft Azure Dataset, and they poses as the main threat of the failures of scheduled background jobs. By using interval predictions, Place Holder accounts for the possibility of such irregularities happening at any time, and hence increases the chance of survival for the scheduled background jobs. Another advantage is that the width of prediction intervals can be controlled by a single parameter, the cluster manager can use such parameter to tune how much it want Place Holder to be conservative. The application to such parameter can depend on the functionality of clusters and the historical performance of the scheduler, that is, whether the cluster is mainly running high priority jobs that the cost of being killed is high, or low priority jobs that can easily restart and cost relatively little when being killed. It can also depend on the historical performance of the scheduler; Based on the survival rate of jobs scheduled on a machine, the scheduler

can determine it want more jobs to survive in exchange of utilizing less possible resources or the other way around. Such trade off will be elaborated further in §3.2.

3.1 Model Selections

Text of paper ...

3.2 Design of Simulation Study

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3.3 Comparisons Against Autopilot

Text of paper ...

3.4 Comparisons Against Neural Network Models

Text of paper ...

3.5 Predicting Maxes VS Predicting Averages

Text of paper ...

4 Predicting Background Jobs

Text of paper ...

5 Combina OF FOREGROUND AND BACKGROUND SIMULATIONS

Text of paper ...

A Appendix

Text of appendix ...

*Title note

[†]Subtitle note