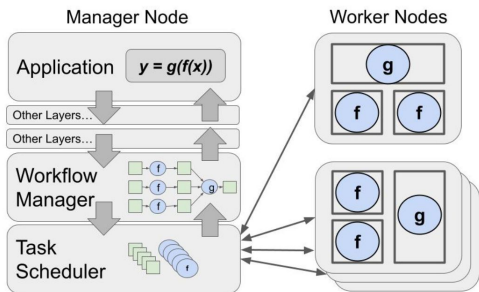


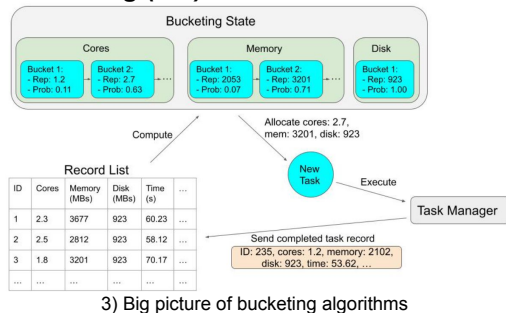
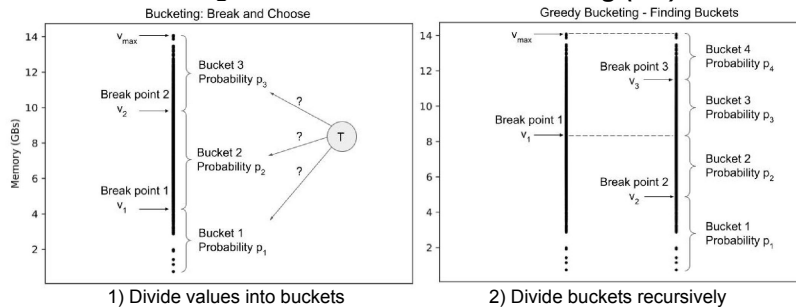
# Adaptive Task-Oriented Resource Allocation for Large Dynamic Workflows on Opportunistic Resources

Thanh Son Phung, Douglas Thain  
Cooperative Computing Lab, University of Notre Dame

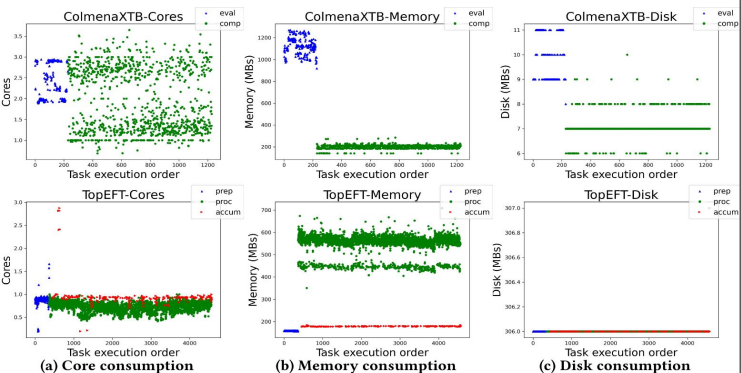
## Background: Dynamic Workflows



## Solution: Novel algorithms - *Exhaustive Bucketing (EB)* and *Greedy Bucketing (GB)*



## Problem: Diverse resource consumption across different resource types



## Evaluation: 7 workflows, 7 algorithms, 3 resources (cores, memory, disk)

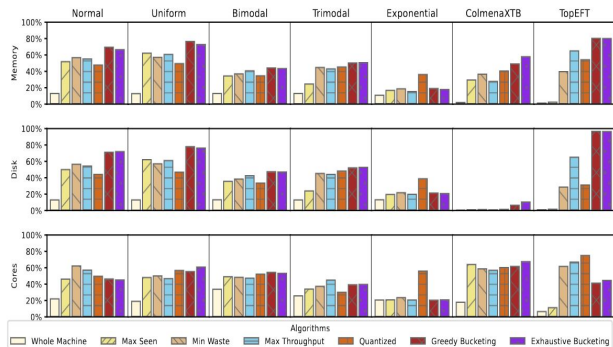


Figure 5: Absolute Workflow Efficiency in cores, memory, and disk of 7 workflows across 7 allocation algorithms.

## Abstract

Dynamic workflows generate tasks on the fly, which complicates the process of resource allocation. This paper addresses the problem by 1) pinpointing the challenge with evidence and the opportunity to optimize for performance, and 2) providing two general-purpose, real-time, performant, no-prior-knowledge allocation algorithms to automate the process of allocating resources. The results show that bucketing algorithms beat the current allocation algorithm on 7 diverse workflows. Future work: gather more workflows, address other resource types, optimize algorithms. This work is integrated into the WorkQueue and TaskVine workflow management systems. This work was supported in part by grant OAC #1931348 "CSSI Elements: DataSwarm: A User-Level Framework for Data Intensive Scientific Computing."

Questions or ideas? Contact [tphung@nd.edu](mailto:tphung@nd.edu)!

