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# An Optimal Job Scheduling Algorithm for Cloud Environment using Enhanced Hyper-Heuristic Approach

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***Abstract:*** *In real world situation, distributed computing's concept cloud computing is the significant idea to upgrade this present reality application. Because of the gigantic utilization of the cloud computing by the buyers it faces numerous obstacles in handling their customer demand. One of the serious issue brought up in cloud computing is scheduling the jobs in the system. Numerous customary frameworks gave the answer for the scheduling the jobs issue in the cloud condition. Be that as it may, neglected to give ideal answer for all classifications of errands and assets. In the proposed methodology, for the classification High Task High Resources, an ideal planning calculation named unsystematic-balancer scheduling algorithm (UBS) has been proposed to explain the job scheduling issues in the cloud condition. The proposed methodology is contrasted and four conventional calculations and the outcomes are assessed to legitimize the presentation of the proposed framework. The proposed UBS calculation performs well when contrasting and the current framework and gives the ideal answer for the class High Task High Resources in the cloud environment.*

***Keywords****: High Task High Resource, Job Scheduling, Execution time, Cloud computing*

## INTRODUCTION AND LITERATURE SURVEY

A large number of the issues, for example, job scheduling issues identified with looking and issues identified with enhancement are settled by the meta-heuristic and hyper-heuristic approaches [1]. Heuristics ID and creation in the improvement issues are understood by Hyper-heuristic methodology [2]. The adequacy of meta-heuristic methodologies for explaining the job scheduling issues in the processing condition are examined [3]. Subterranean insect province improvement calculation was utilized to create work booking arrangement for the network condition [4].

Existing insect settlement calculation joined with the League title and Bat calculation to comprehend the issues in the balancing of the cloud environment [5]. To deliver ideal answer for work process planning issues in cloud computing and the near investigation had done [6]. The investigation on molecule swarm streamlining was done to frame the target work in an ideal path for the job scheduling issue in the cloud condition [7]. An epic asset bunching calculation named RDENP was proposed to tackle the job scheduling issues in the cloud condition [8].

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The half breed calculation which is mix of hereditary calculation and fluffy rationale was utilized to take care of the job scheduling issues in the cloud condition [9]. To limit the activity cost on the cloud condition finish time driven hyper heuristic calculation was proposed [10]. The amalgamation of hereditary calculation and neighborhood search calculation called memetic calculation was proposed to take care of the activity planning issue in the cloud condition [11]. To deliver an ideal execution assessment framework nonstop Markov chain and Poisson process was consolidated to create ideal arrangement [12].

## CATEGORY HIGH TASK HIGH RESOURCE

The term defined as high task should be scheduled with the high resources. The attained experimental results are displayed in the form of values through tables and graphs. The minimal task taken for this case is 109 and minimal resources taken for this case is 88, where the maximum task is 183 and maximum resource taken for this case is 151.

## RESULTS AND DISCUSSIONS

The table 1 represents the Hybrid Invasive Weed Optimization (HIWO) result for this case. The 9 set of tasks ranging between 183 to 109 and 9 set of resources ranging between 151 to 88 have been used for this high task high resource case. The maximum Makespan 11.58352 for 183 tasks and minimum makespan 2.765452 for 109 tasks are resulted for this High task and high resource case by Hybrid Invasive Weed Optimization. The detailed result is shown in the table 1 and figure 1.

Table 1: HIWO

| Number of Tasks | Number of Resources | Makespan | Processing Speed in Cumulative Percentage |
|---|---|---|---|
| 183 | 151 | 11.58352 | 18.82733 |
| 166 | 136 | 10.6712 | 36.17182 |
| 159 | 128 | 8.1462 | 49.41229 |
| 151 | 125 | 7.65432 | 61.85327 |
| 142 | 118 | 6.3105 | 72.11008 |
| 137 | 109 | 5.6349 | 81.26879 |
| 121 | 103 | 4.90473 | 89.24072 |
| 116 | 95 | 3.8542 | 95.50516 |
| 109 | 88 | 2.765452 | 100 |

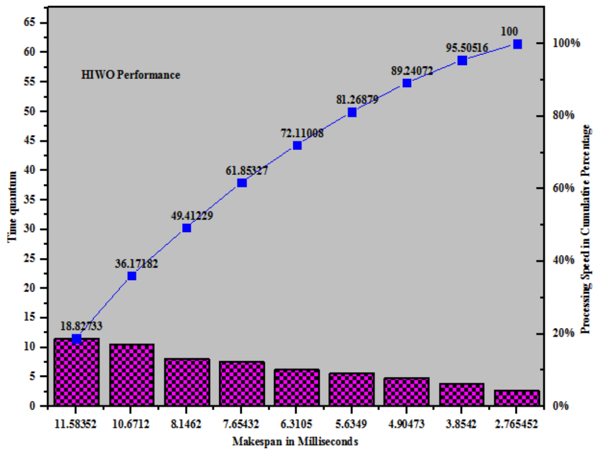


Figure 1: Makespan of HIWO for High Task High Resource

The table 2 represents the Hyper-Heuristic scheduling algorithm (HHSA) result for this case. The same range of tasks and resources will be used by all existing algorithms for the case High task high resource. The maximum Makespan 11.56312 for 183 tasks and minimum Makespan 2.30574 for 109 tasks are resulted for this High task and high resource case by Hyper-Heuristic scheduling algorithm. The detailed result is shown in the table 2 and figure 2.

Table 2: HHSA

| Number of Tasks | Number of Resources | Makespan | Processing Speed in Cumulative Percentage |
|---|---|---|---|
| 183 | 151 | 11.56312 | 18.72462 |
| 166 | 136 | 10.8028 | 36.21803 |
| 159 | 128 | 8.54521 | 50.05563 |
| 151 | 125 | 7.47801 | 62.16507 |
| 142 | 118 | 6.74912 | 73.09419 |
| 137 | 109 | 5.99332 | 82.79942 |
| 121 | 103 | 4.90258 | 90.73836 |
| 116 | 95 | 3.41365 | 96.26622 |
| 109 | 88 | 2.30574 | 100 |

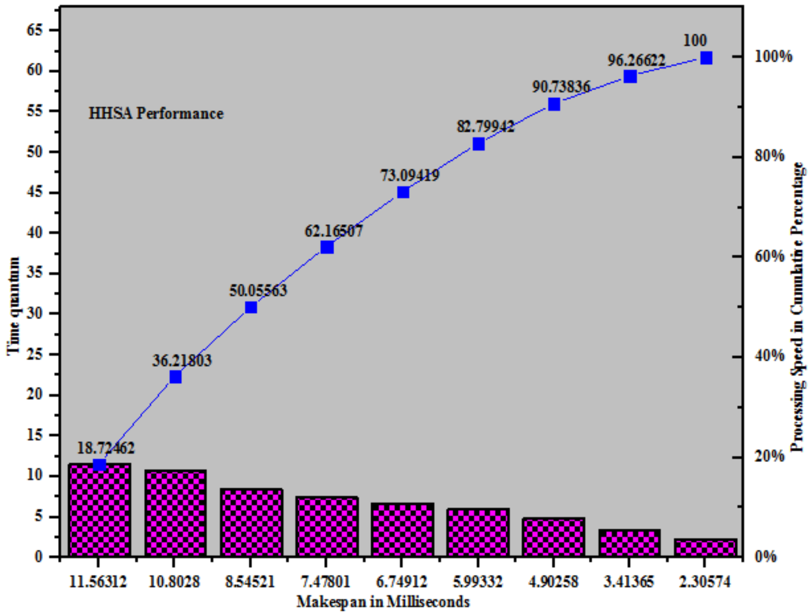


Figure 2: Makespan of HHSA for High Task High Resource

The table 3 represents the Completion Time Driven Hyper-Heuristic approach (CTDHH) result for this case. The same range of tasks and resources will be used by all existing algorithms for the case high task high resource. The maximum Makespan 11.34542 for 183 tasks and minimum Makespan 2.592131 for 109 tasks are resulted for this high task and high resource case by Hyper-Heuristic scheduling algorithm. The detailed result is shown in the table 3 and figure 3.

Table 3: CTDHH

| Number of Tasks | Number of Resources | Makespan | Processing Speed in Cumulative Percentage |
|---|---|---|---|
| 183 | 151 | 11.34542 | 18.77059 |
| 166 | 136 | 10.14646 | 35.55754 |
| 159 | 128 | 8.10723 | 48.97066 |
| 151 | 125 | 7.91546 | 62.0665 |
| 142 | 118 | 6.2138 | 72.34701 |
| 137 | 109 | 5.72132 | 81.81273 |
| 121 | 103 | 4.91362 | 89.94213 |
| 116 | 95 | 3.4871 | 95.71141 |
| 109 | 88 | 2.592131 | 100 |

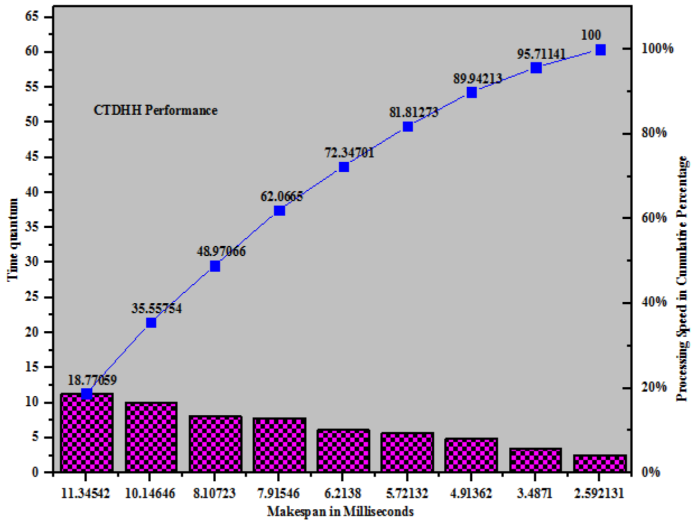


Figure 3: Makespan of CTDHH for High Task High Resource

The table 4 represents the Invasive Weed optimization (IWO) result for this case. The same range of tasks and resources will be used by all existing algorithms for the case high task high resource. The maximum Makespan 11.4617 for 183 tasks and minimum Makespan 2.74102 for 109 tasks are resulted for this high task and high resource case by Hyper-Heuristic scheduling algorithm. The detailed result is shown in the table 4 and figure 4.

Table 4: IWO

| Number of Tasks | Number of Resources | Makespan | Processing Speed in Cumulative Percentage |
|---|---|---|---|
| 183 | 151 | 11.4617 | 18.87353 |
| 166 | 136 | 10.26621 | 35.77849 |
| 159 | 128 | 9.27164 | 51.04574 |
| 151 | 125 | 7.2012 | 62.90367 |
| 142 | 118 | 6.21045 | 73.13017 |
| 137 | 109 | 5.2613 | 81.79375 |
| 121 | 103 | 4.94243 | 89.93225 |
| 116 | 95 | 3.37302 | 95.48647 |
| 109 | 88 | 2.74102 | 100 |

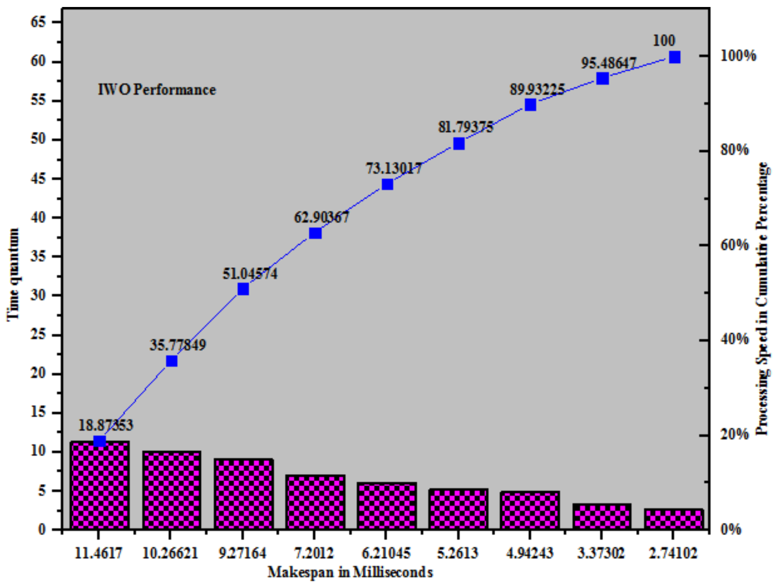


Figure. 4. Makespan of IWO for High Task High Resource

The table 5 represents the Unsystematic-Balancer Scheduling (UBS) result for this case. The same range of tasks and resources will be used by this proposed approach, which was used by all the existing algorithms for the case High task high resource. This shows the comparison between the proposed and existing algorithms. The maximum Makespan 11.4617 for 183 tasks and minimum Makespan 2.74102 for 109 tasks are resulted for this High task and high resource case by Enhanced Hyper-Heuristic scheduling algorithm. The detailed result is shown in the table 5 and figure 5.

Table 5: UBS

| Number of Tasks | Number of Resources | Makespan | Processing Speed in Cumulative Percentage |
|---|---|---|---|
| 183 | 151 | 11.4617 | 18.87353 |
| 166 | 136 | 10.26621 | 35.77849 |
| 159 | 128 | 9.27164 | 51.04574 |
| 151 | 125 | 7.2012 | 62.90367 |
| 142 | 118 | 6.21045 | 73.13017 |
| 137 | 109 | 5.2613 | 81.79375 |
| 121 | 103 | 4.94243 | 89.93225 |
| 116 | 95 | 3.37302 | 95.48647 |
| 109 | 88 | 2.74102 | 100 |

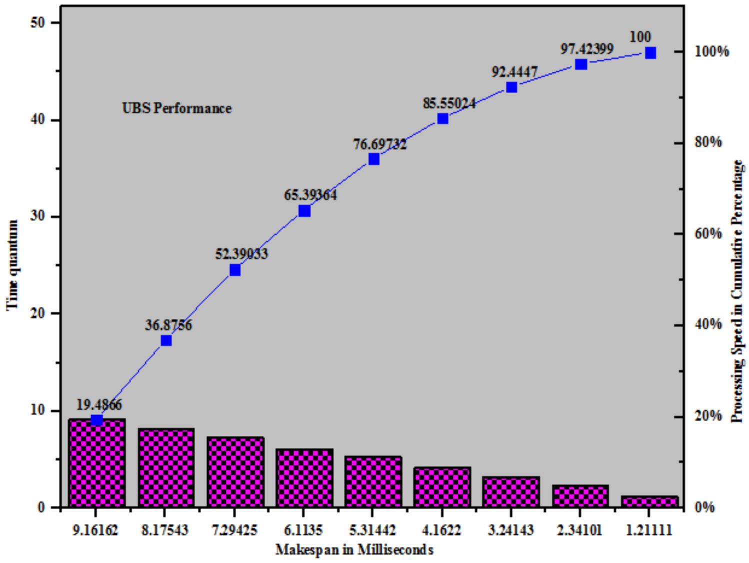


Figure 5: Makespan of UBS for High Task High Resource

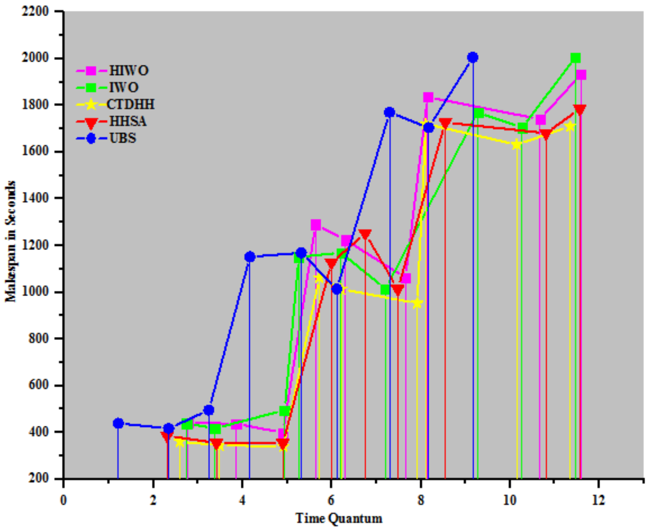


Figure 6: Proposed approach vs Existing approaches

The experimental results of the existing systems IWO, CTDHH, HHSA and HIWO for scheduling the high task with high resources are mentioned above along with the proposed approach UBS results. It is clearly noted that the proposed approach performs well by resulting in minimum makespan. For an instance, for 183 tasks the Makespan produced by the proposed approach UBS is 11.4617 as the existing systems HIWO produced 11.58352, HHSA produced 11.56312, CTDHH produced 11.34542 and IWO produced 11.4617.

## CONCLUSION

The principle goal of this examination work is to deliver the ideal answer for the job scheduling issues in the cloud network. There are four classes in the assets and the assignments, for example, low errand high asset, high undertaking low asset, low errand low asset and high assignment high asset. The proposed methodology built up a calculation named UBS algorithm to create the ideal arrangement in the cloud condition. Contrasting with the current approach proposed approach performs well and creates the ideal answer for the cloud network. Further it is wanted to create ideal answer for all the kind of undertakings and assets by building up an effective calculation for whole distributed computing.

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