

# INJECT AN ELASTIC GRID COMPUTING TECHNIQUES TO OPTIMAL RESOURCE MANAGEMENT TECHNIQUE OPERATIONS

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## ABSTRACT

Evaluation of sharing on the Internet well- developed from energetic technique of grid computing. Dynamic Grid Computing is Resource sharing in large level high performance computing networks at worldwide. Existing systems have a Limited innovation for resource management process. In proposed work, Grid Computing is an Internet based computing for Optimal Resource Management Technique Operations (ORMTO). ORMTO are Elastic scheduling algorithm, finding the Best Grid node for a task prediction, Fault tolerance resource selection, Perfect resource co-allocation, Grid balanced Resource matchmaking and Agent based grid service, wireless mobility resource access. Survey the various resource management techniques based on the performance measurement factors like time complexity, Space complexity and Energy complexity find the ORMTO with Grid computing. Objectives of ORMTO will provide an efficient Resource co-allocation automatically for a user who is submitting the job without grid knowledge, design a Grid service (portal) for selects the Best Fault tolerant Resource for a given task in a fast, secure and efficient manner and provide an Enhanced grid balancing system for multi-tasking via Hybrid topology based Grid Ranking. Best Quality of Service (QOS) parameters are important role in all RMT. Proposed system ORMTO use the greater number of QOS Parameters for better enhancement of existing RMT. In proposed system, follow the enhanced techniques and algorithms use to improve the Grid based ORMTO.

**Keywords:** Optimal Resource Management Technique Operations, Elastic Scheduling, Best and Fault Tolerance Grid Node Selection, Resource Co-Allocation, Grid Balanced Resource Matchmaking and Mobility Resource Access

## 1. INTRODUCTION

Role of Optimal Resource Management Technique (ORMT) is Request Handle, Dispatch, Schedule, Information Manage, Transfer Manage, Query Process, resource allocation, Broker Resource Management Technique (BRMT), Agent based grid service, resource match making, resource selection, resource discovery, resource coordination, resource monitoring, resource access, resource sharing, resource recovery, resource management, resource access based on broker/agent, resource reservation and utilization, grid balancing. Grid

end user or Authorized Resource Requestor asks the Grid service to ORMT. ORMT receive and resolve the request from the grid end user. After the request is resolved, ORMT asks the grid service from the service or resource provider. Here, Resources are services, software, platform, infrastructure, supercomputer, DB, storage space, virtual organization, virtual machine, cluster, server, personal computer, webcam, printer, scanner .... Registered service providers give a response to ORMT. ORMT give response to requester based on high-level scheduling, allocation, monitoring and QOS -Quality of Service (Barzegar *et al.*, 2011)

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## 2. PROBLEM STATEMENT

### 2.1. Objectives of Proposed System

Objectives of ORMTO will provide an efficient Resource co-allocation automatically for a user who is submitting the job without grid knowledge, design a Grid service (portal) for selects the Best Fault tolerant Resource for a given task in a fast, secure and efficient manner and provide an Enhanced grid balancing system for multi-tasking via Hybrid topology based Grid Ranking. End User doesn't want the grid and resource knowledge only submit job to the portal. Grid service (portal) will take care of all knowledge about the Optimal Resource Management Techniques (ORMT) automatically based on OGSA (Open Grid Services Architecture).

### 2.2. Issues in Existing System

- Issue 1: In the Existing system grid technologies do not have efficient resource monitoring and prediction strategies (Ostberg and Elmroth, 2013). It does not co-operate with various components to achieve high performance reason is, it does not have sufficient resources. Finding a Best Grid Node for the Task allocation is the major problem which most of the Grid Infrastructure has in today's world
- Issue 2: Topological structure is not well defined for Fault tolerant Cloud resource selection service
- Issue 3: Scheduling phase is not follow the dynamic and intelligent Grid/Cloud component selection. Scheduling is based on the resource co-allocation request from user run-time estimation. As user run-time estimations are usually very imprecise that is not clear
- Issue 4: Need to improve the accuracy and improve the Customer Satisfaction.
- Issue 5: Dynamic cloud load balancing and Fault tolerances technique service time is not good
- Issue 6: Manual fault calculation and Lacking in wireless mobility grid resource access

### 2.3. Proposed System Solutions

It focuses on ORMTO:

- Solution 1. Scheduling the resource co-allocation request based on system generated predictions through Discovery service and Priority based on fairness with user history

- Solution 2. Selection of the best Grid node for task prediction in the dynamic grid computing to provide the best Resource selection for jobs and hence yielding the best result based on GRP-PSO
- Solution 3. Faults tolerant grid resource Selection gets high resource Availability based on Hybrid GRP-PSO
- Solution 4. EC2 algorithm use to design a well-defined hybrid topology to increase the quality of grid balancing and perfect matchmaking process
- Solution 5. Broker/Agent Resource Management Techniques is used to increase the speed of Grid Service (Javanmardi *et al.*, 2013) Resource availability is increased from agent migration and fault tolerance agents
- Solution 6. Fault can be identified and load can be balanced very quickly. This fully automated failure Detection Grid service access from anywhere at any time through grid portal

## 3. PROPOSED SYSTEM: ORMTO

Optimal Resource management Technique Operations (ORMTO) Umbrella is covering a more well defined technical components like listed in sub heading (Surendran and Varthini, 2012).

### 3.1. Elastic Scheduling Algorithm

An Elastic Scheduling based on Priority, System history, Grid Network capability, number of jobs with size, system generated prediction and Negotiation. In Existing Model, End User wants the grid and resource knowledge then only possible to work in the grid network (Pradoa *et al.*, 2012). Scheduling is a key issue which must be solved in grid computing study and a better scheduling scheme can greatly improve the efficiency (Raj and Vasudevan, 2011).

#### 3.1.1. ORMT Based Elastic Scheduling

In **Fig. 1**, Scheduling algorithm will also consider various factors like Priority, System history, Grid Network capability, number of jobs with size, system generated prediction, Negotiation and Co-scheduling.

Architecture of the elastic scheduling, starting with the creation of Directed Acyclic Graph, the nodes are being extracted with the corresponding information and can compute the communication demands, host capacity, cost constraint using the fuzzy scheduler, which can be able to determine the starting time of the task and data transfer time.

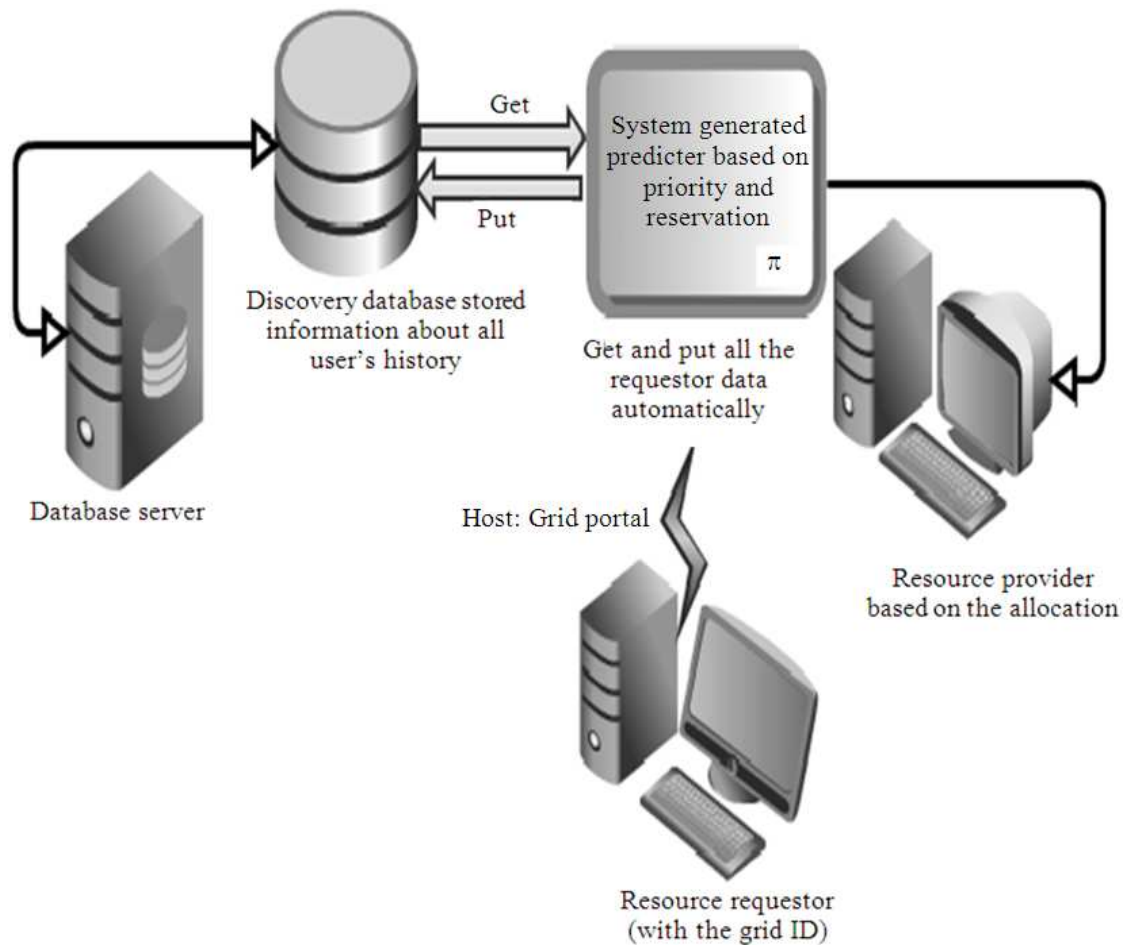


Fig. 1. Block Diagram of ORMT based elastic scheduling

### 3.1.2. Algorithm of Elastic Scheduling

PROCEDURE PRORITY SCHEDULING (G,U,V)

//G-Grid network represent by graph

Step 1: Compute the indegree 0 vertex (V) [available free Resource]

Step 2: Store that indegree 0 vertex from priority queue (enqueue and dequeue)

Step 3: Get the next vertex (U) from the grid network

Step 4: For all edges (U,V) update the indegree of V and put V in the queue if the updated indegree 0.

Repeat steps 3 and 4 while the queue is not empty.

### 3.2. Finding the Best Grid Node for a Task Prediction

Find the Best Grid Node based on GRP (Grid Resource Prediction pattern)-PSO (Particle Swarm

Optimization) Algorithm. Optimization algorithm presented and named as GRP-PSO. GRP- PSO is combination of Particle Swarm optimization (PSO) algorithm and Grid Resource Prediction Pattern (GRP). Present a new optimization algorithm called Genetic Algorithm and show its effectiveness. In existing work, Particle Swarm Optimization algorithm was weak in Local search, Grid Resource Prediction pattern has been used to improve the quality and finding best grid node (Hu *et al.*, 2012).

#### 3.2.1. ORMT Based Finding the Best Grid Node

Grid Resource Prediction (GRP) Service sends request to Grid History and Prediction database to update the Grid Node's process and execution of task and also sends request to all the Grid Node to find the best

Iteration of Resource and task process through the Grid Resource Prediction Patter and Particle Swarm Algorithm. Administrator with multiple or Grid Remote Evaluator service can be same Geographical location or Different Geographical Location. Grid Resource Revelation pattern has History, Grid Resource Revelation Model, Prediction for each Resource (rs). Whenever want to update any data about any of the Grid Node specify it in History Data. Query the history database to find the very least used Resource.

### 3.2.2. Algorithm Description

Step 1: Represent the problem domain as a chromosome of fixed length n; Choose the size of population of chromosomes N, a crossover probability pc and a mutation probability pm

Step 2: Define a fitness function f to measure the performance (fitness) of an individual chromosome in the problem domain.

Step 3: Randomly generate an initial population of chromosomes of size N: x1, x2, ..., xN

Step 4: Calculate the fitness of each individual chromosome: f(x1), f(x2), ..., f(xN)

Step 5: Select a pair of chromosomes for mating from the current population. Parent chromosomes are selected with a probability related to their fitness.

Step 6: From those parents, create a pair of offspring chromosomes by applying the genetic operator crossover and mutation.

Step 7: Place the created offspring chromosomes in the new population.

Step 8: Repeat from Step 5 until the new population size equals the old population size

Step 9: Replace the initial chromosome population with the new population

Step 10: Go to Step 4 and repeat the process until some termination (or optimization) criterion is satisfied

### 3.2.3. Genetic GRP-PSO Algorithm

Calculation for Cost evaluation for Grid Computing Resource

Step 1: Start and Initialize every Particle with Random Position and velocity vectors.

```
// Init a,b with random position in [-3,3]:
double a = Random.NextDouble() * 6 - 3;
double b = Random.NextDouble() * 6 - 3;
double[] particlePos = { a, b };
//Init va, vb Random velocity in [-3,3]:
double va = Random.NextDouble() * 6 - 3;
double vb = Random.NextDouble() * 6 - 3;
```

```
double[] particleVel= { va, vb };
Step 2: Start finding the cost based on Each Particle using Random values like a,b.
Calculate Cost by passing a, b Param Value and return the cost from Random values a, b.
calculateCost(double a, double b)
{
return 100 * (a * b - b * b) * (a * a - b * b) + (1 - a) * (1 - a);
}
```

```
public double CalculateCost1(double a, double y)
{
double c =
3 * (1 - a) * (1 - a) * Math.Exp(-a * a) - (b + 1) * (b + 1) - 10 * (a / 5 - a * a * a - b * b * b * b * b) * Math.Exp(-a * a - b * b) - 1 / 3 * Math.Exp(-(a + 1) * (a + 1) - b * b);
return 1 - c;
}
```

Step 3: Use the history data and Grid Resource Prediction Pattern Data (GRP) from the Prediction database to find the pbest value.

Step 4: Match this Current Cost (C) with Best value so far (pbest), When Cost (C) is better than pbest value assign it pbest using Cost(c).

For each Particle Position Evaluate cost(C)

If Cost (C) is better than pbest then

pbest = C

End if

Loop

Step 5: Result of pbest will be considered to be lowest cost of all particles. Assign the pbest lowest cost value to gbest.

Gbest = pbest

Step 6:

NewVel = New Velocity

CurVel = Current Velocity

Ran1, Ran2 = Random Number in the interval

[0,1]

Coeff1, Coeff2 = Accelerated Coefficient

CurPos= Current Position

NewPos= New Position

Calculate the New velocity using below formula

NewVel = CurVel + Coeff1.ran1. (pbest-a) + Coeff2.ran2. (gbest - a)

Step 7: Calculate the New Position using below formula NewPos= CurPos+NewVel

Iterate the about formula to find the best position with Minimum cost value.

### 3.2.4. Experimental Result of Best Grid node Detection

Best Grid Nodes found from the values of shortest distance, population, individual, fittest, genome by using Genetic Algorithm.

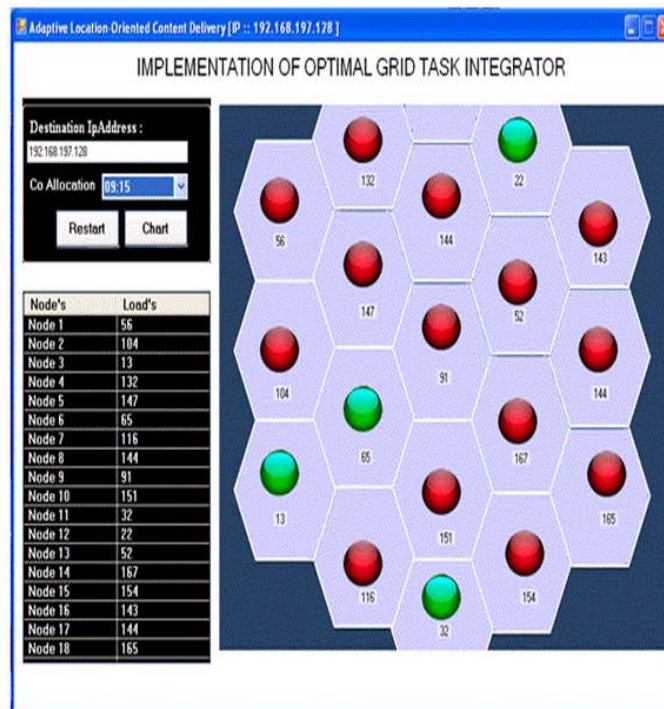


Fig. 2. Job runs through best grid nodes

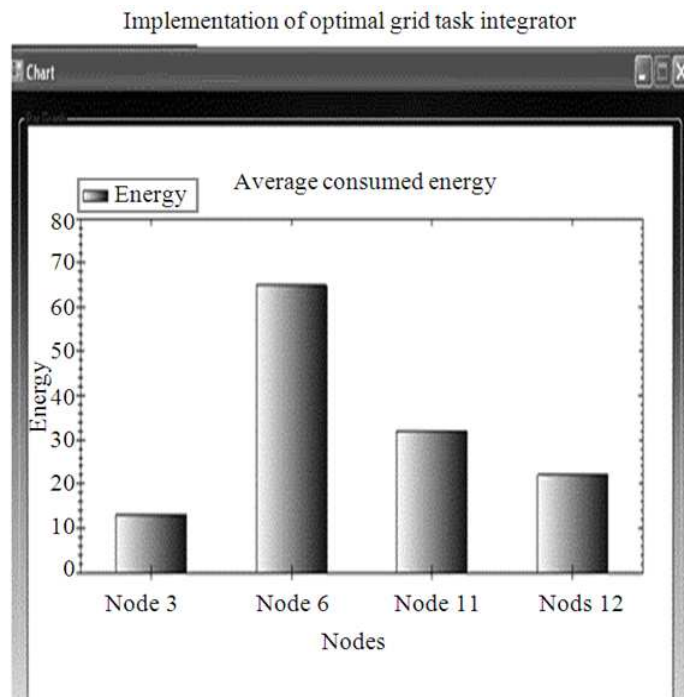


Fig. 3. Energy level chart for best grid nodes





Fig. 4. Hybrid Genetic GRP-PSO based faults tolerant resource selection

Figure 2, shows the Job execution flow through Best Grid Nodes. For Best Resources Monitoring we take one sample application as File Transfer Grid Service with energy level from Fig. 3.

### 3.3. Fault Tolerance Resource Selection

Perfect fault tolerant grid resource selection for multi task prediction is based on Hybrid Genetic GRP-PSO algorithm. Grid Computing has limitations in the existing system for resource monitoring and prediction strategies (Bouyer and Sap, 2010). This grid technology does not have efficient resource monitoring and prediction strategies (Dobre et al., 2011).

#### 3.3.1. ORMT Based for Fault Tolerance Resource Selection

Based on Single Sign on, Hybrid Genetic GRP- PSO is combination of Particle Swarm optimization (PSO) algorithm and Grid Resource Prediction Pattern (GRP) from two or more grid networks.

#### 3.3.2. Algorithm Description

Faults Tolerant Grid Resource Selection ()

Input: Set of available resources {R}

Output: Resource selection from requirements

Step 1: Detect the possible faults at the time of resource selection.

Step 2: Design and implement a fault detector and a fault manager.

Step 3: Compute the Resource based on high ranking, high priority, failure aware, less bandwidth

Fault tolerances grid system gets high resource Availability.

#### 3.3.3. Faults Tolerant Resource Selection Results

In Fig. 4, Minimum Cost value can be achieved through above iteration using Hybrid Genetic GRP-PSO Algorithm. Finding the Minimum cost value to find the best node in grid Environment is found through the Iterated Minimum cost value.

### 3.4. Perfect Resource Co-Allocation

Enhanced Resources Co-Allocation are used to allocate the multiple resources for different applications efficiently. Different resources are not available in an every workplace that time co-Allocation help to access the all resources from anywhere at any time via grid computing. In Existing Model, scheduling the resource co-allocation request is done using user run time estimation. As user run time estimations are usually very imprecise that is not clear (Netto and Buyya, 2008).

#### 3.4.1. ORMT based for Resource co-Allocation

System generated predictions are better parameters than user run time estimates for Resource co-Allocation (Netto et al., 2011).

### 3.4.2. Algorithm

#### SYSTEM GENERATED PREDICTION ( )

Step 1: Aggregate the job have executed in the past based on similarity jobs executed on grid network (user History and utilization of resource)

Step 2: Predict from technicality, usability issues, priority And Misconceptions

Step 3: Predict the code analysis, analytic benchmarking/Code profiling and statistical prediction

### 3.4.3. Partitioning Leach Cluster's Algorithm Description

Step 1: Select no of resource requester placed in dynamic approach.

Step 2: Submission of user query to resource broker.

Step 3: Sent user's job to resource provider, resource provider process the job request.

Step 4: To find tower based on shortest energy path approach based on leach cluster mechanism.

Step 5: To correlate tower position (x,y) with mobility node position(x,y) for partitioning based clustering technique used to find shortest energy path.

Step 6: To find shortest energy path, we have taken Number of mobility nodes Vs tower position using energy optimization technique.

### 3.5. Grid Balanced Resource Matchmaking

Grid balanced Resource matchmaking based on Evaluation Come Classification (EC2) to a Job. Grid balanced Resource matchmaking process achieve Coordinated and optimized resource sharing, enhanced security management, Cost optimizations. Improved performance substantially, backup plan in case the system fails even partially, maintain the system stability, accommodate future modification in the system and avoid a situation where some nodes are heavily loaded while others are idle or doing little work. Most Resource matchmaking approaches are depend on the best grid resource selection from fault tolerance, shortest distance, low cost, high energy, load balanced techniques (Qiang *et al.*, 2011; Ning and Shaohua, 2013; Folling *et al.*, 2010). Existing systems have a Limited innovation for resource matchmaking process.

Optimal RMT for Grid balanced Resource grid balanced resource selection based on Evaluation Come Classification (EC2) to a job at Runtime. EC2 algorithm describes three things such as:

- Grid resource evaluation and classification

Evaluation: Based on Resource Discovery, Resource Monitoring and QoS (Quality of Service) parameters.

Classification: Grid ranking use to classify the grid resources based on QoS parameters:

- Grid Evaluation system by Scheduler

Scheduler rating the resources based on grid ranking. Grid ranking provide a high priority rating for local scheduler (no need of network bandwidth and transport time), Next medium priority rating for Meta scheduler (advanced reservation) and then next low priority rating for remote scheduler.

Scheduler evaluates the job based on the following steps, Step 1: Job Submission; Step 2: Job Monitoring; Step 3: Job Control; Step 4: Job Migration; Step 5: Job Termination.

3. Job evaluation and classification. EC2 algorithm use to design a well- defined hybrid topology, Increase the quality of grid balancing and Detect the fault tolerance grid resource from the available resources with an advanced concept of resource co-allocation, Perfect priority scheduling, Grid ranking, resource communication intensive and Grid balancing:

- Case 1: Based on job execution time
- Case 2: Based on priority value of job
- Case 3: Based on environmental status of job
- Case 4: Based on situation base of job processing
- Case 5: Based on job similarity
- Case 6: Based on job's working platform

### 3.6. Agent Based Grid Service and BRMT

Large Scale Multi Agent's based Resource Management on grid Service. Agents are used to migrate, one supplier to another supplier easily based on grid balancing technique. Large scale agent means number of agents is large. For deploying the application via host, first predict the best agent from a lot of distributed active agents (Surendran and Varthini, 2012). Resource availability is increased from Broker/agent migration and fault tolerance agents. Richer forms of sharing and increased qualities of service in Agent based grid service.

#### 3.6.1. Broker's Resource Management Technique (BRMT)

The resource broker provides pairing services between the service requester and the service provider.

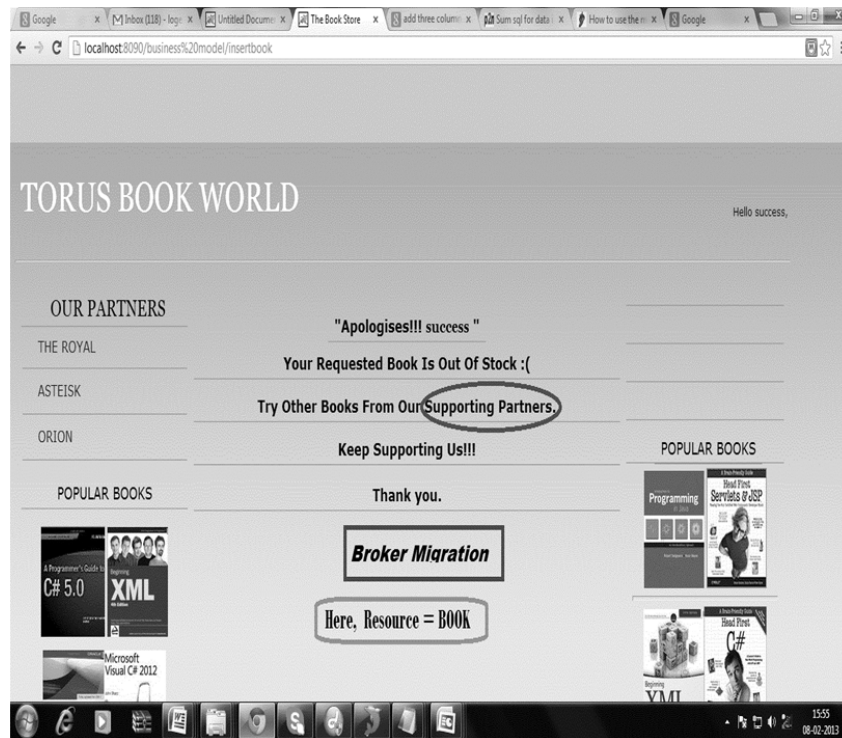


Fig. 5. Broker migration

### 3.6.2. Algorithm

- Step 1: To begin with secured grid service at first have to login inside the service based on single sign on for different grid networks.
- Step 2: At first suggestion based service request can be done. The broker can give valuable suggestion for the resource to the resource requesting users.
- Step 3: If the resource is available in the particular in particular service they can purchase and just they can add to cart.
- Step 4: If the particular product is not available in one service by job migration process it automatically skip to other service.
- Step 5: The entire activity is carried out by grid brokers. Meta broker enables the users to access resources of different grids through their own brokers.
- Step 6: Based upon the location the resource requisition can be done. Famous places got some famous resource so that it is the easy way of the resource requisition.
- Step 7: The end of the lifetime the history of the purchased resource is very important for its service period.

### 3.6.3. Experimental Result of Broker Migration

In Fig. 5, if the available Product is not available in the particular service through job migration it skips to other supporting partner.

### 3.7. Excellent Wireless Mobility Resource Access

Access the wireless resources via resource providers, simultaneously from the grid portal for a job (Singh, 2011; Singh *et al.*, 2013). Existing systems was not containing the inclusive disjunction model, so not efficient to get the cleaned data and normal data.

Propose an ORMT technique for proposed attack-resistant, which is based on a dynamic, probabilistic model of the current attack situation.

In Equation 1, Distance Calculation algorithm:

$$\text{Distance} = (A / \text{Quality}) * (1.92 / 2) \tag{1}$$

Here:

- A = rssi\*rssi
- rssi = Received Signal Strength Indicator
- Quality = Strength of Wi-Fi signal





**Fig. 6.** Distance of the wireless mobility resource based on Wi-Fi/GPS grid services

In Equation 2, Location estimation algorithm:

$$L = \sum_{r=1}^R P(L_r | XV) \cdot L_r \quad (2)$$

Here The algorithm:

- r = r-the reference location,
- R = Reference locations,
- L = The estimated location,
- $P(L_r|XV)$  = Probability of measuring X

### 3.7.1. Algorithm

*Step 1:* Login Admin system.

*Step 2:* Get signal from Resources.

This is the process to get the tracking signal from resource. The signal may be Wi-Fi (or) GPS.

*Step 3:* Store the Resource Information.

The tracked information can be stored in .gpx format. In this format can be converted in to RDBMS for storing data in GRID database.

Xml to RDMS File

The user can be entering into the Wi-Fi user will log on to the services/then the user will use the services.

The input file in the form of xml files and the file can be clustered and the file in the form of RDMS format.

*Step 4:* Monitoring Source.

Date and Time Calculation is made from the .gpx log file.

*Step 5:* Resource Security.

The Security of resource can be monitored from end user.

### 3.7.2. Experimental of wireless mobility Resource Access

In Fig. 6, gpx format file can contains like xml file and display traced mobility grid services with time and date. Calculate the node or resource distance.

## 4. CONCLUSION

This study is introduced an extensive level for Resource Management Technique (RMT). ORMTO use to reduce a cost, save a high-level energy, Increase the resource availability, Avoid the failure, Increased User satisfaction, easy handling for all levels of users, high Quality of Service (QoS), Reduce the Space and Time complexity in the grid network. This Paper can be

providing a help to find a new research point in this field [ORMTO] in Future.

## 5. ACKNOWLEDGEMENT

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