# Dr. J. Octavio Gutiérrez-García
# Distributed Systems and Applied Artificial Intelligence

- Research Topics
  - Distributed systems
  - Computational Intelligence
  - Affective computing
  - Artificial intelligence applications

- Research Projects
  - Agent coalitions for load balancing in cloud data centers
  - A genetic algorithm for the maximum 2-packing set problem
  - A mechanism for biasing the appraisal process in affective agents

- Publications
  - ORCID

- Contact Data:
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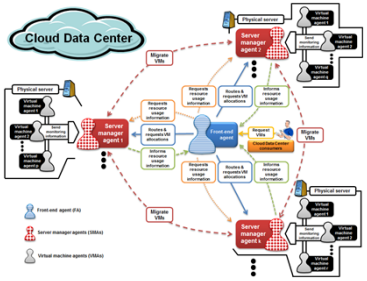
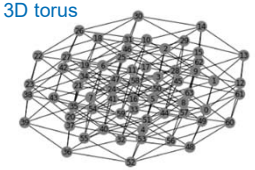
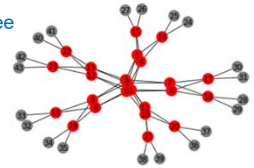



***Data center architectures***

4-ary 3D torus



Fat-tree



$\beta_i$ : Number of gigabytes of memory required by $VM_i$
$\beta_{it}^{\%}$ : Percentage of memory usage of $VM_i$ at time $t$
$C_{jt}$ : Available number of cores of host $j$ at time $t$
$M_{jt}$ : Available memory (expressed in gigabytes) of host $j$ at time $t$

*Decision variable*

$$x_{ijt} = \begin{cases} 1 & \text{if } VM_i \text{ migrates to host } j \text{ at time } t \\ 0 & \text{otherwise} \end{cases}$$

*Objective functions*

$$Min\left(f\left(T, \alpha_i, \alpha_{it}^{\%}, \beta_i, \beta_{it}^{\%}, x_{ijt}, C_{jt}, M_{jt}\right)\right) \quad (1)$$

$$Min \sum_{i=1}^{n}\sum_{j=1}^{m}\sum_{t=1}^{T} x_{ijt} \quad (2)$$

*Subject to*

$$\sum_{j=1}^{m} x_{ijt} \leq 1 \quad \forall i \forall t \quad (3)$$

$$\sum_{i=1}^{n} \alpha_i x_{ijt} \leq C_{jt} \quad \forall j \forall t \quad (4)$$

$$\sum_{i=1}^{n} \beta_i x_{ijt} \leq M_{jt} \quad \forall j \forall t \quad (5)$$

$$x_{ijt} \in \{0, 1\} \quad (6)$$