

# Improving Run Times with Cube Cluster

Testing more scenarios more quickly with existing resources

---

Running a travel forecasting model frequently takes many hours, sometimes days. Citilabs' new product, Cube Cluster, can dramatically cut model run times by distributing run processes across multiple processors or multiple PCs.

Cube Cluster can distribute model runs two ways:

1. Simple allocation: Cube Cluster orders the run steps across available processors and PCs. For example, Cube Cluster might run the trip generation model on one PC and the network building and skimming on a second PC.
2. Complex allocation: Cube Cluster allocates each zone or zone group across available processors and PCs. For example, when running a mode choice model, Cube Cluster might process origin zones 1-100 on one PC and origin zones 101-200 on a second PC.

Cube Cluster is an add-on module to Cube Base. In the initial version, Cube Cluster brings simple allocation to all Cube-initiated processes and complex allocation to two Cube Voyager modules:

- Highway — Used for traffic assignments and skimming
- Matrix — Used for demand model and matrix manipulation

In most travel models, these two modules contain the large and complex processes.

## Example time savings

You can experience significant drops in run time with Cube Cluster. For example:

- One model currently runs in about 10 hours on one PC. Running the same model across five PCs with Cube Cluster drops the run time to 2 hours and 20 minutes.
- Another model runs in 4 hours on one PC. Splitting the model across four PCs with Cube Cluster reduced the run time to 1 hour and 7 minutes.
- Distributing a highway assignment run across two processors reduces each iteration in half, from two minutes to one minute. Distributing the same run across eight

---

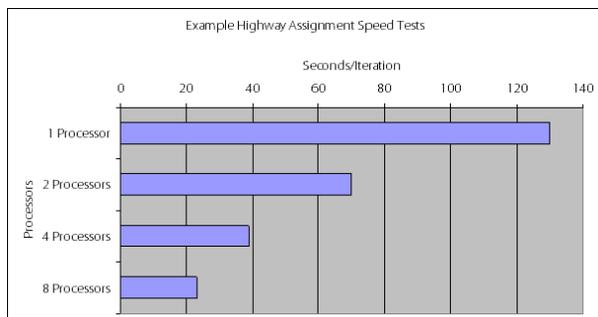
**Citilabs, Inc.**  
312 Clay Street, Suite 180  
Oakland, California 94607, USA

**World Wide Web**  
[www.citilabs.com](http://www.citilabs.com)

Copyright © 2006 Citilabs, Inc. All rights reserved.  
Citilabs is a registered trademark of Citilabs, Inc. All other brand names and product names are trademarks, registered trademarks or trade names of their respective holders.

Many factors contribute to the results described. Citilabs does not guarantee results for all customers. Citilabs has carefully reviewed the accuracy of this document, but shall not be held responsible for any omissions or errors that may appear. Information in this document is subject to change without notice.

processors reduces each iteration by more than 80 percent, to just more than 20 seconds.



Cube Cluster is truly a huge advance in travel forecasting. Cube Cluster greatly reduces run times, increasing a modeler's ability to respond quickly to management and client demands and to efficiently run and test many more scenarios. Cube Cluster has no scaling restrictions. You could take a model system and run it across 100 PCs, perhaps reducing run times to several minutes!

## How does it work?

The distributed processing approach requires a network of computers:

- 1. Primary PC.** You designate one computer as the primary PC and install the model process and input data on this computer. You must have a full license of Cube Voyager (standard desktop license) and a license of Cube Cluster for this computer. With Cube Cluster, you configure your model to run across the available processors or PCs in your network. For example, if connected through a standard office Ethernet network, you might select several of the existing office PCs.
- 2. Node PCs.** You configure other computers in your network as node PCs, computers across which Cube Cluster can distribute computing processes. Node PCs do not require Cube Cluster, nor do they require a full license of Cube Voyager. Each node PC or processor only requires a low-cost "node" license of Cube Voyager. You cannot use machines with node

licenses to start a model run or to run a model process independently. You can only use machines with node licenses in distributed processing, commanded by the primary PC.

Once you start a model run, Cube Cluster distributes the process across the selected PCs or processors and executes the model. Cube Cluster stores the resulting data and print files on the primary PC for analysis and mapping.

## How much does it cost?

You must have a full license of Cube Voyager and Cube Base, a license of Cube Cluster, and any required node licenses. A full license of Cube Voyager and Cube Base costs \$13,500 for the first seat. Discounts are available for multiple seats. Cube Cluster costs \$1500 per license. Node licenses are \$1500 per seat.

For example, suppose you have one seat of Cube Base and Cube Voyager and you wish to run your model across 3 PCs. You would need to purchase:

- One seat of Cube Cluster: \$1500
- Two Cube Voyager node licenses: \$1500 x 2 or \$3000

Total cost would be \$4500. Depending on your model, this configuration should reduce your run times by about two-thirds. If your model runs in 6 hours today, then with this Cube Cluster configuration, the run time would drop to slightly more than 2 hours.

Want to make it run faster? Purchase more low-cost Cube Voyager node licenses for \$1500 each.

## But my mode choice model is in Fortran (Java, C...). Will it run faster?

Yes and no. For a mode choice model, Cube Cluster might distribute the computations for different trip purposes across different processors. If you have coded your mode choice model in a programming language, you must create separate executables for each trip

purpose. With separate executables, Cube Cluster can allocate the different trip purposes to different processors or PCs.

Alternatively, you can take advantage of a specially priced offer from Citilabs to convert models from Fortran, Java, C, etc., to native Cube Voyager scripting. Converting your existing models to Cube Voyager scripting would enable you to take full advantage of the Cube Cluster's

complex allocation capabilities and generate large time savings.

### Can I try it out?

Definitely. We are currently offering 30-day trial licenses of Cube Cluster to existing clients. Contact your sales representative today at [sales@citilabs.com](mailto:sales@citilabs.com) to organize a trial.

*Cube Cluster is one of the many innovative and market-leading solutions developed by Citilabs—the leader in transportation planning software solutions.*