Argonne NATIONAL LABORATORY

Traffic Modeling and Simulation

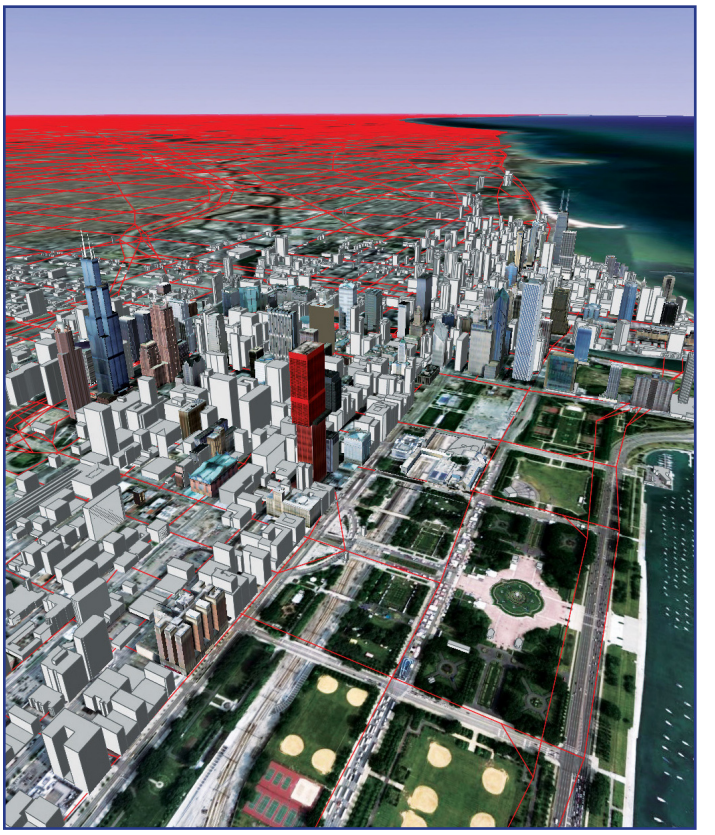
By running multiple computers in parallel, TRACC is making TRANSIMS more effective; this will significantly reduce the simulation time, allow for higher fidelity of the scenarios, and result in much faster turnaround times for existing models.

Background

Argonne National Laboratory's Transportation Research and Analysis Computing Center (TRACC) has been tasked by the U.S. Department of Transportation (USDOT) to deploy a new paradigm in transportation simulation that holds the promise of providing answers to many pressing transportation problems at a level of detail never before possible. A recently-developed simulation code, the Transportation Analysis and Simulation System (TRANSIMS), can model each individual traveler's second-by-second movements in a large metropolitan transportation system, including all possible modes of ground transportation, such as the traveler's use of automobiles, buses, trains, streetcars, and even walking.

TRACC's Software

TRANSIMS was designed to meet state departments of transportation and metropolitan planning organizations' need for more accurate and more sensitive travel forecasts for transportation planning. The Federal Highway Administration, Federal Transit Administration, Office of the Secretary of Transportation, and the Environmental Protection Agency funded the development of TRANSIMS. It is available at no charge through the TRANSIMS open-source project at SourceForge (**http://transims-opensource.org**).



TRACC, Northern Illinois University, and the Chicago Metropolitan Agency for Planning are updating the road network in the Chicago Business District based on aerial photography and other public and commercial resources to provide the high-fidelity input required by the microsimulation code TRANSIMS.

For Users

TRACC actively promotes the use of TRANSIMS on its high-performance cluster through direct support for modelers working on USDOT-related projects. TRACC's

experts have developed extensive training materials for use of TRANSIMS, including a 3-day training course with lectures spanning the entire scope of the application. The training course is held several times a year with participation over the Internet, allowing access to as large of a user community as possible. The materials are also online for the modeling community.

TRACC staff is also working to make the TRANSIMS application more effective and user-friendly. Regular interaction with potential users of TRANSIMS has been established to find appropriate solutions to their simulation needs. Collaborative code modifications are made in an open-source community. TRACC staff is working to enhance TRANSIMS's compatibility with Linux computing platforms, and to deploy TRANSIMS through such efforts as the preparation of installable modules and source code packages.

Current Projects

The sheer amount of computing power necessary to simulate the movement and the interactions of all travelers continuously over a 24-hour period on metropolitan networks that can span 10,000 square miles or more is daunting, but has been proven on somewhat smaller scales by USDOT using data from Washington, D.C., and other cities. Using its high-performance computing resources and experience in transportation system analysis and in parallelization of large-scale applications, TRACC is applying TRANSIMS on a much broader scale to an area that covers the entire Chicago metropolitan area; from Rockford on the west, to Milwaukee on the north, and Kankakee and Gary on the south.

In another project, TRACC researchers and the Illinois Terrorism Task Force are using a TRANSIMS model of the Chicago metropolitan area to simulate the progress and impact of emergency evacuations in the Chicago Business District. TRANSIMS is a particularly promising modeling tool for this application because of its unique capability to cover large metropolitan areas (and therefore far-reaching effects) while microsimulating on a second-by-second basis the escape movements of all individuals. Although the individuals in TRANSIMS comprise a "synthetic" population (based on extrapolations of census data), their whereabouts at any time of the day is well known, and behavioral models can be incorporated as needed. However, such a TRANSIMS model is particularly difficult to build because of the extensive need for detailed data and the associated computing time.

For futher information, contact

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