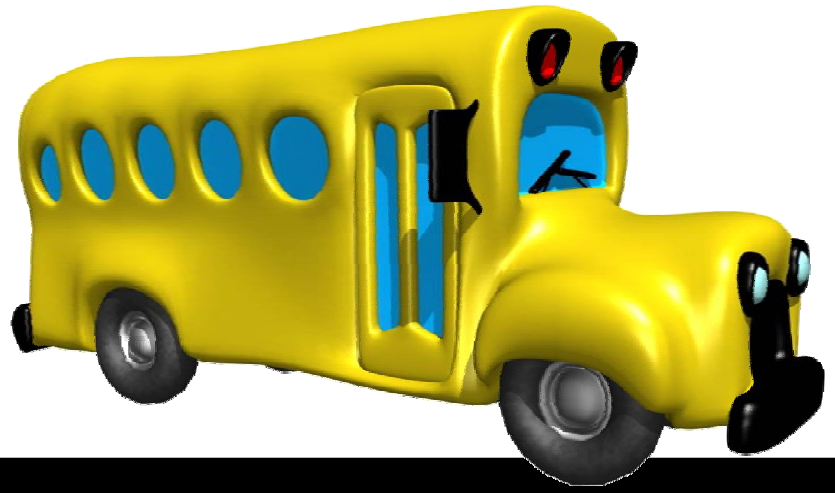
Edulog.nt Run Optimization

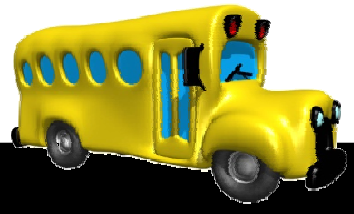
Using Simulation & Optimization to Develop a More Efficient Transportation Plan



Simulation Concept in Edulog.nt

- Using the simulation feature is a way to make run and route changes in your system in “practice” mode.
- You can try any new routing scenario from a simple change to a complicated revision without worrying about affecting your real data.

Note: Run and Route Optimization are only available *through* Simulation.



NOTE 1

All manual references refer to the:

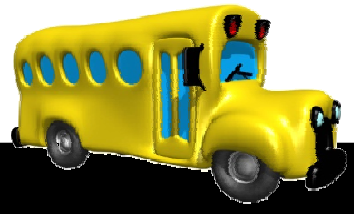
2007 TIMS/Edulognt User Manual

This manual may also be downloaded by following these directions:

WWW.NCBUSSAFETY.ORG

> TIMS – School Bus Routing

> Documentation



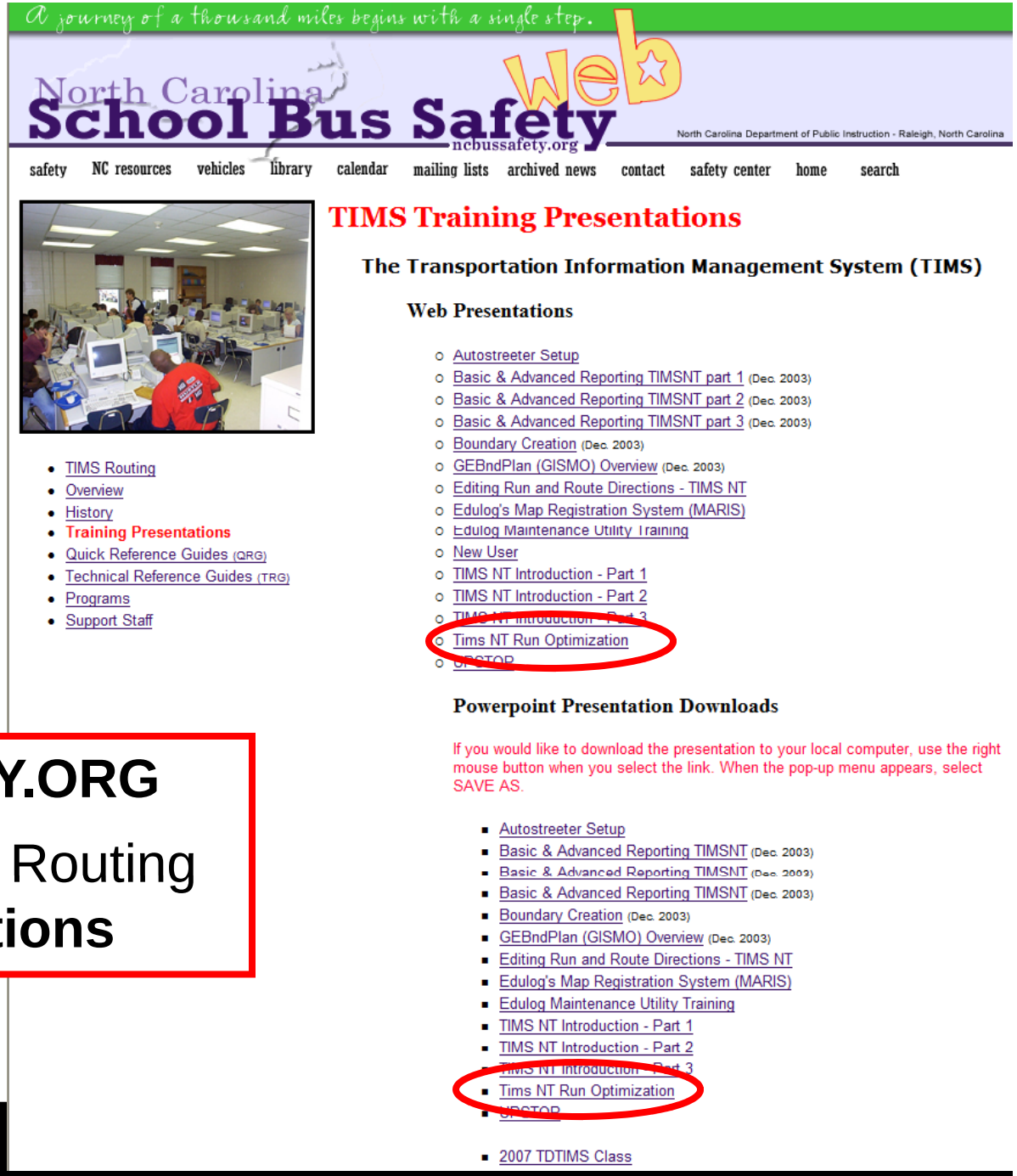
NOTE 2

The full Optimization PowerPoint may be viewed and/or downloaded at:

WWW.NCBUSSAFETY.ORG

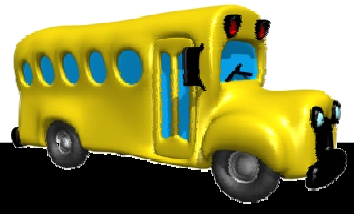
> TIMS – School Bus Routing

> Training Presentations



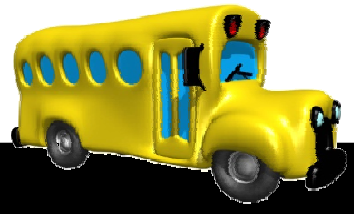
What Is Run Opt?

Run Opt is a component of simulation that helps you create a new set of bus runs from an existing set of stops



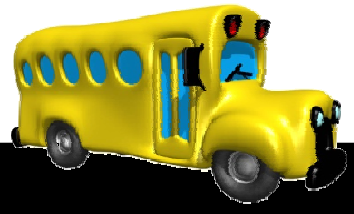
Overview

1. Define your problem
2. Verify that your Data is up to date
3. Run Optimization - Get First Best Solution
4. Run Simulation – Refine your Solution
5. Route optimization
6. Implement Solution



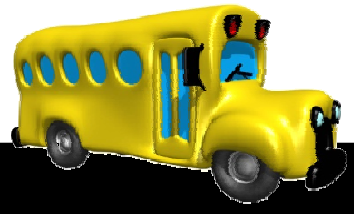
Define Your Problem

- **One time specific need** or part of a plan for **monitor your transportation plan**.
- Are you trying to reduce runs
  - For total fleet
  - Certain schools or area
  - Is there a target number?
- Are you optimizing due to redistricting, new schools, or staggered bell times ,Single tier to multi tier?



Verify Your Data

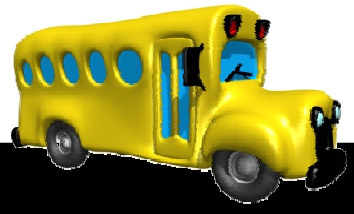
- **Stop data** – Must be Current and ALL stops located – Do NOT have to be on runs.
- All other transportation data should be current.
- **Maps** must be current.
- Student data – **Assignments** must be current for capacity to be accurate.
- If redistricting, **Boundaries** must be current.
- **Bell times** must be current or set to proposed changes.



Verify Your Data

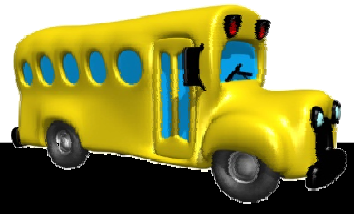
Things to Consider:

- Run optimization **will not work with transfers.**
- **Which stops** to include - Fall Planning, Staggering, Merging Transportation?
- **Multi-school** scenarios - current or possible?
- **Bell time changes** – Current/Proposed?
- Are new tiering scenarios possible?



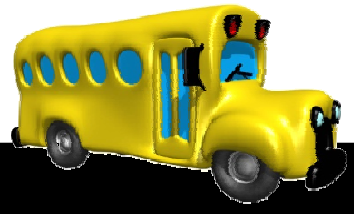
Improvements

- One set of tools for manipulating Runs and Routes are used in Simulation and Regular Data.
- Optimization functions are limited to the creation of new “starting points” --- all the other tools used for cleanup and refinement are the same as those used elsewhere in the system.



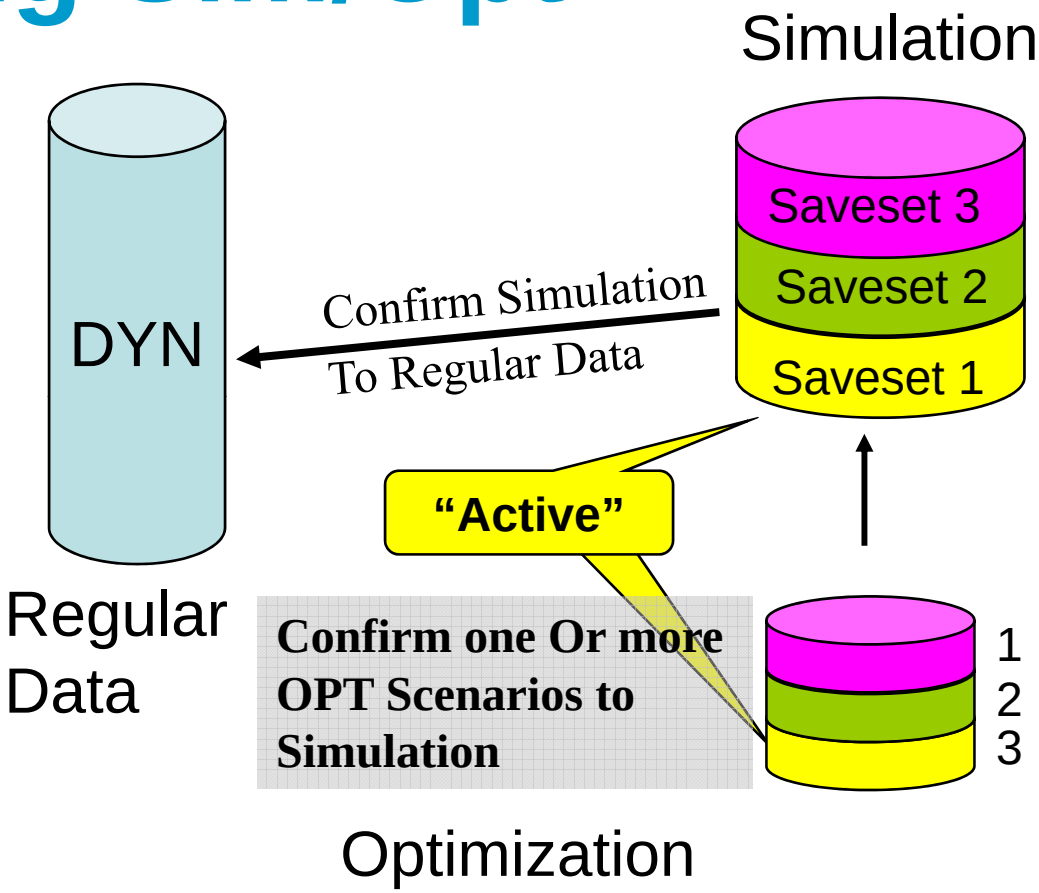
Results

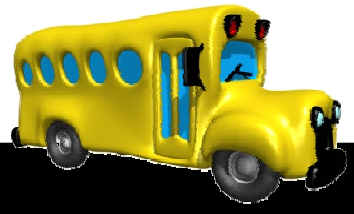
- Sim/Opt in Edulog.nt is similar to what you see in Edulognt with stops and runs
- Fewer separate kinds of functions to learn to accomplish the same tasks
- Much greater flexibility in developing scenarios and saving various solutions



Using Sim/Opt

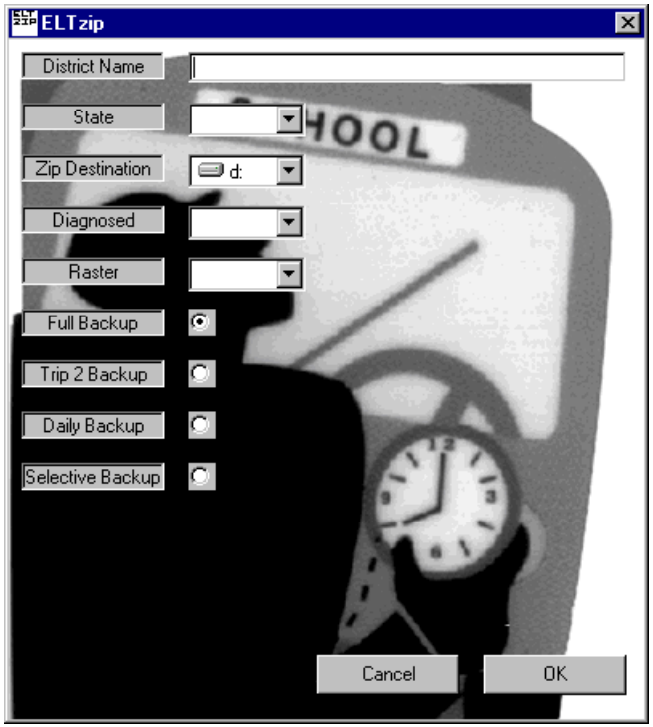
- Optimization may or may not be used once you are in Simulation
- If you do use OPT, you confirm OPT to SIM, then SIM to regular data

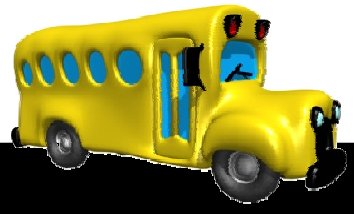




Back Up Your Data!

- The number of savesets and locations of SIM and OPT data can be confusing
- Back up first in case you confirm something into your regular data by mistake!





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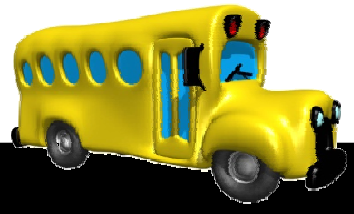
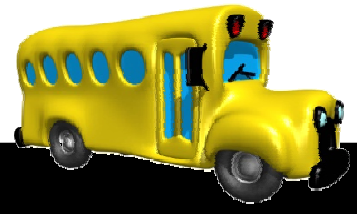


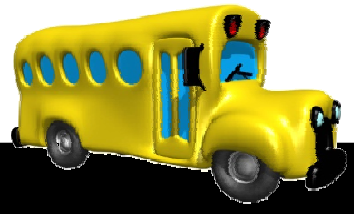
How does it all work?

1. Know what your plan is!
2. Start EdulogNT
3. >File > Enter Simulation
   - Load the Stops and/or Runs (Use Worklists!)
4. >File > Enter Optimization > Runs
5. Complete Optimization (save one or more SaveSets)
6. >File > Exit (This Returns you to Simulation)
7. Cleanup Optimization Solution
8. Exit Optimization (Save to real database if satisfied with solution)



Entering Simulation
The ‘Other’ Option

- The yellow “S”  takes you into the Simulation
- Only after you enter Simulation can you proceed with Run Optimization

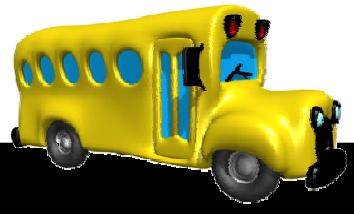


Enter Optimization

1. From Simulation: File>Enter Optimization>Run
2. >Problem Definition > School/Stop Selection

REMEMBER

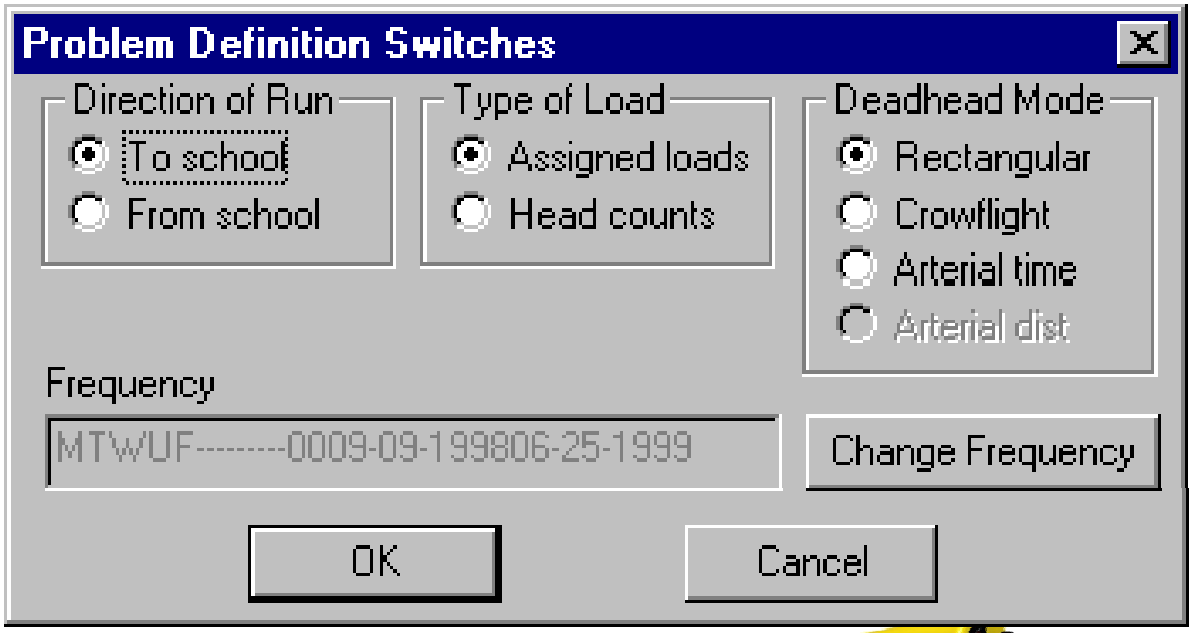
- When to load data?
- You can only work with data loaded properly into your Simulation



Run OPT Problem Definition

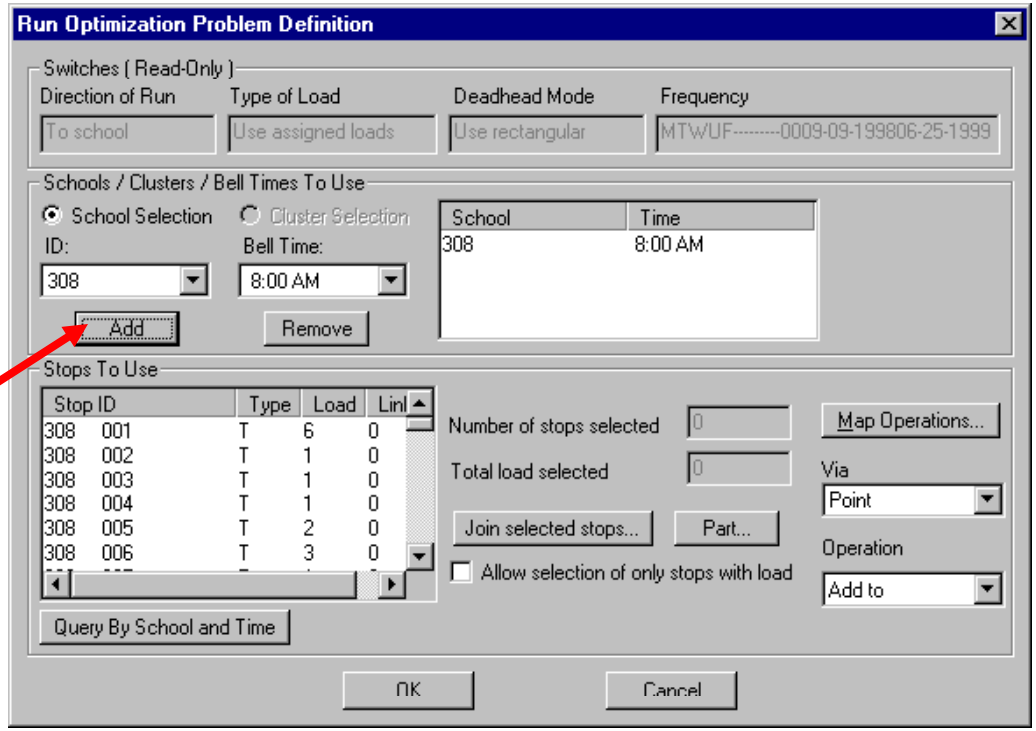
The first screen you will see asks you to decide basic questions about your Run OPT session.

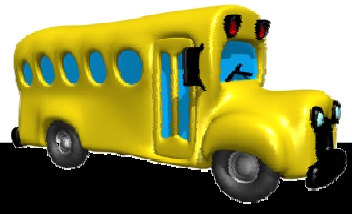
- AM or PM
- Assigned Load or Head Count
- Deadhead Mode



Run OPT Problem Definition

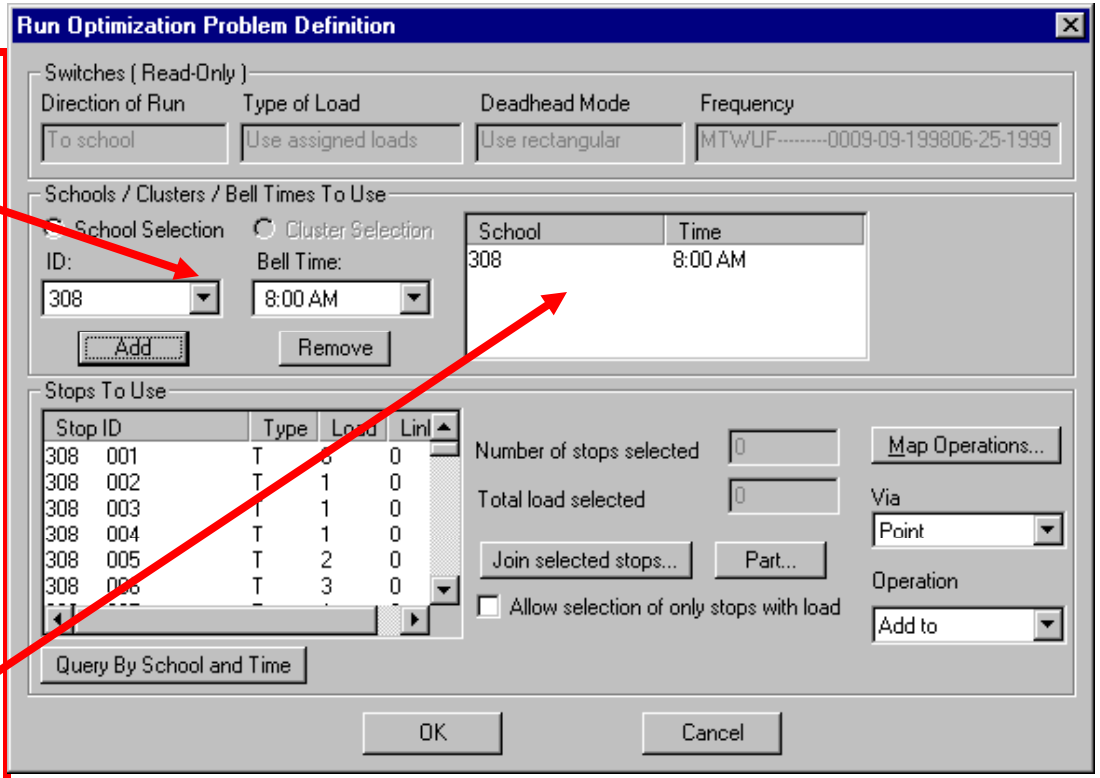
- Next, you will determine which of your loaded schools will be included in this problem
- Click the Add button to add your selections to the stops to use

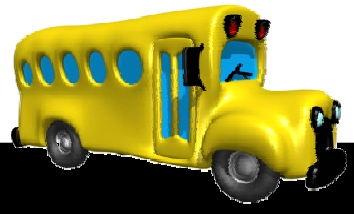




Run OPT Problem Definition

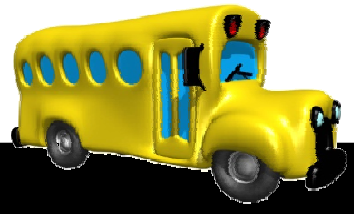
- If you are working with more than one school, you would select it from the pull down, and add it as well
- The second school would then appear in the right window





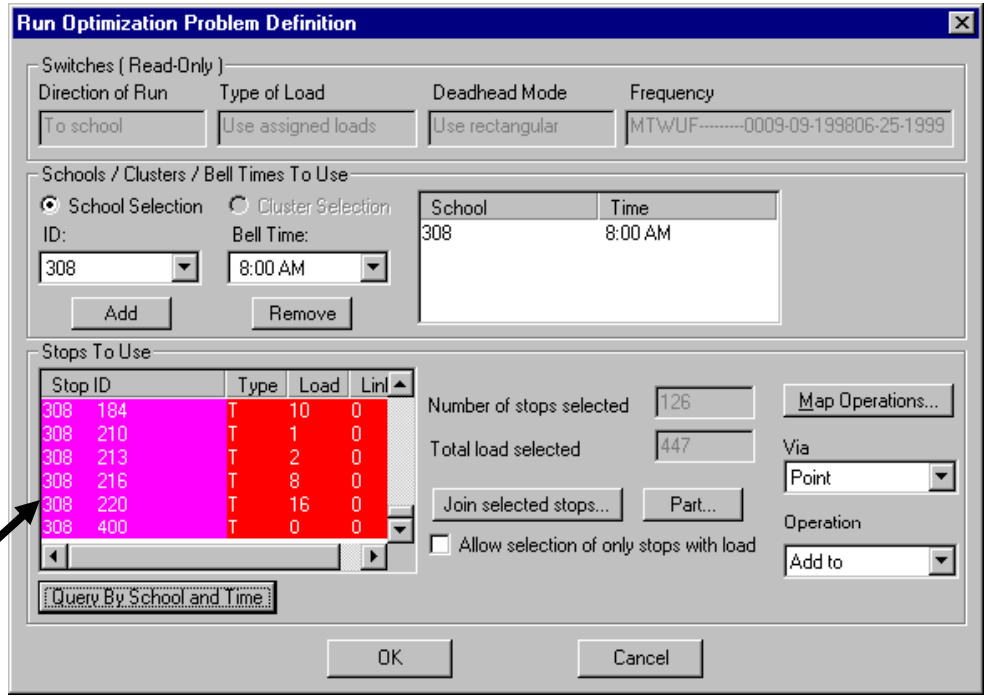
Loading Data

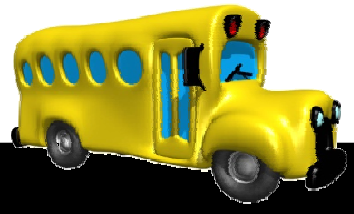
- Load School Stops!
  - Run Optimization won't function until at least one school stop has been loaded (i.e. 304.000).
  - If you only load cluster stops, you will have to manually load schools before you can use Opt.
- Load Stops
  - Load the set of stops you want to work with from a worklist, range, or individually by stop number.



Selecting Stops

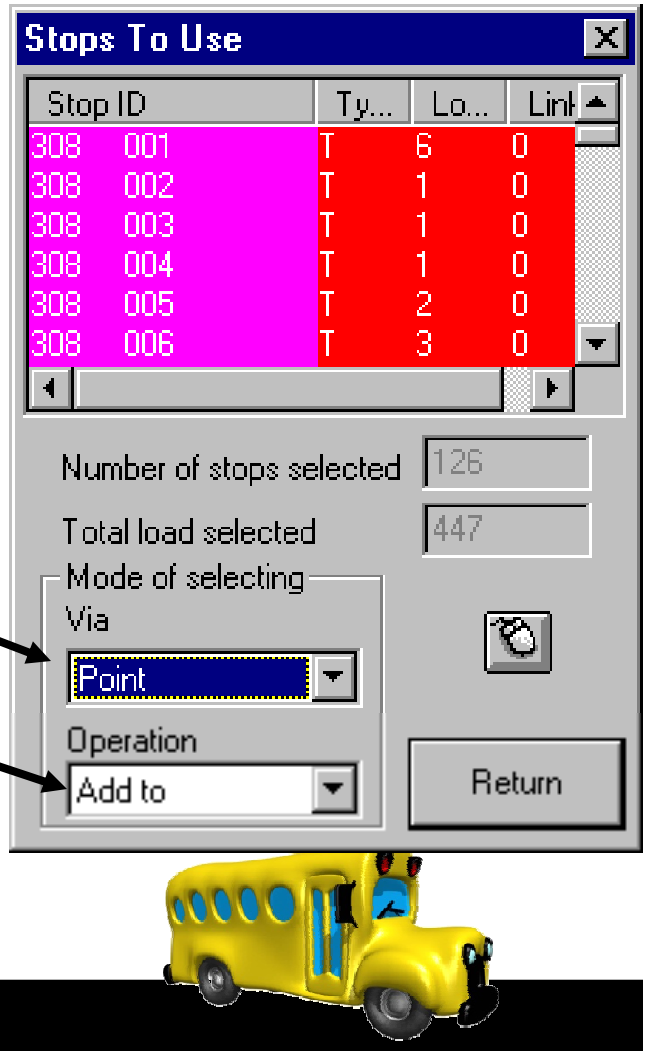
- You must select stops before you can proceed
- You can do this by selecting the top stop and scrolling down to the bottom of the window and holding <shift> down while selecting the last stop





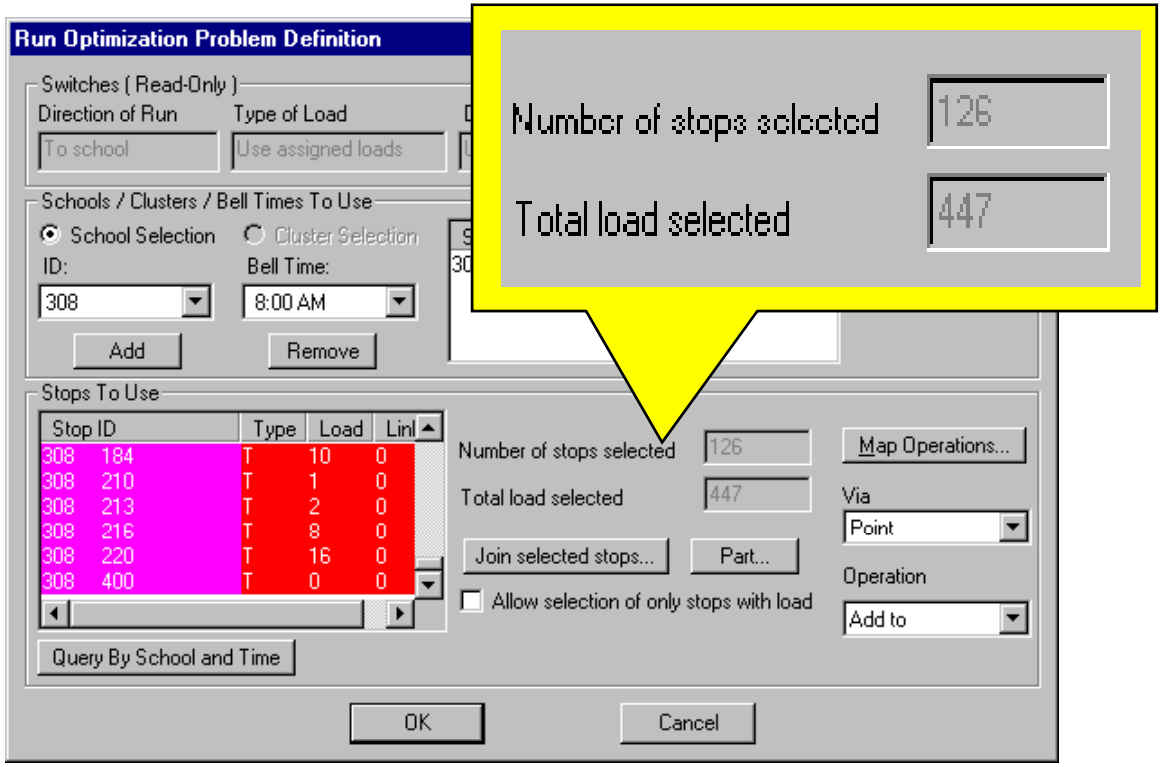
Selecting Stops via the Map

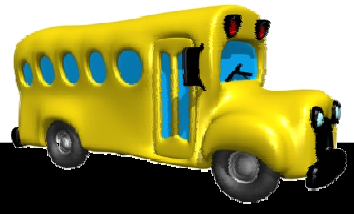
- Selecting on Map Operations brings up a different “Stops to Use” window
- This allows you to pick stops by Point or Polygon with options for Adding or Removing stops
- Click Return when you have finished selecting stops



Finishing Problem Definition

Note the number of stops and load selected before selecting OK

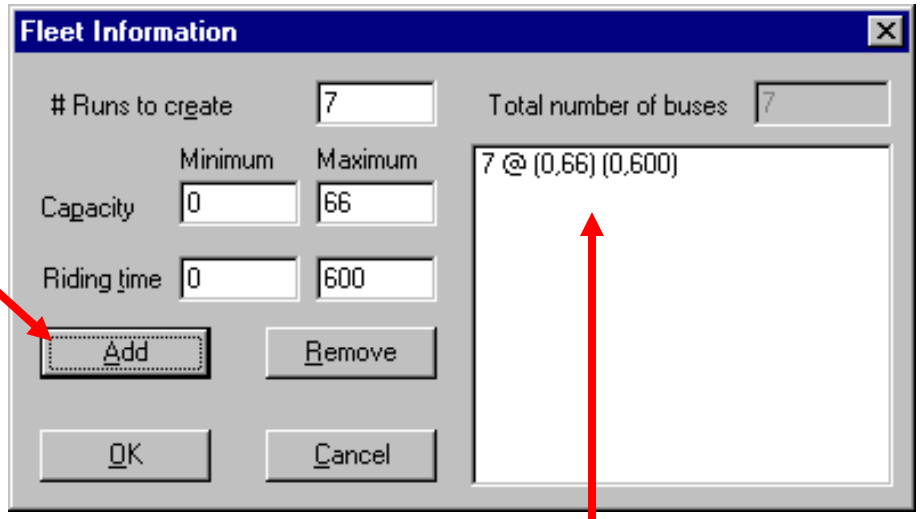


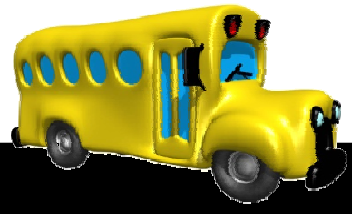


Global Moves>Run Generation

Select the number of buses and capacity

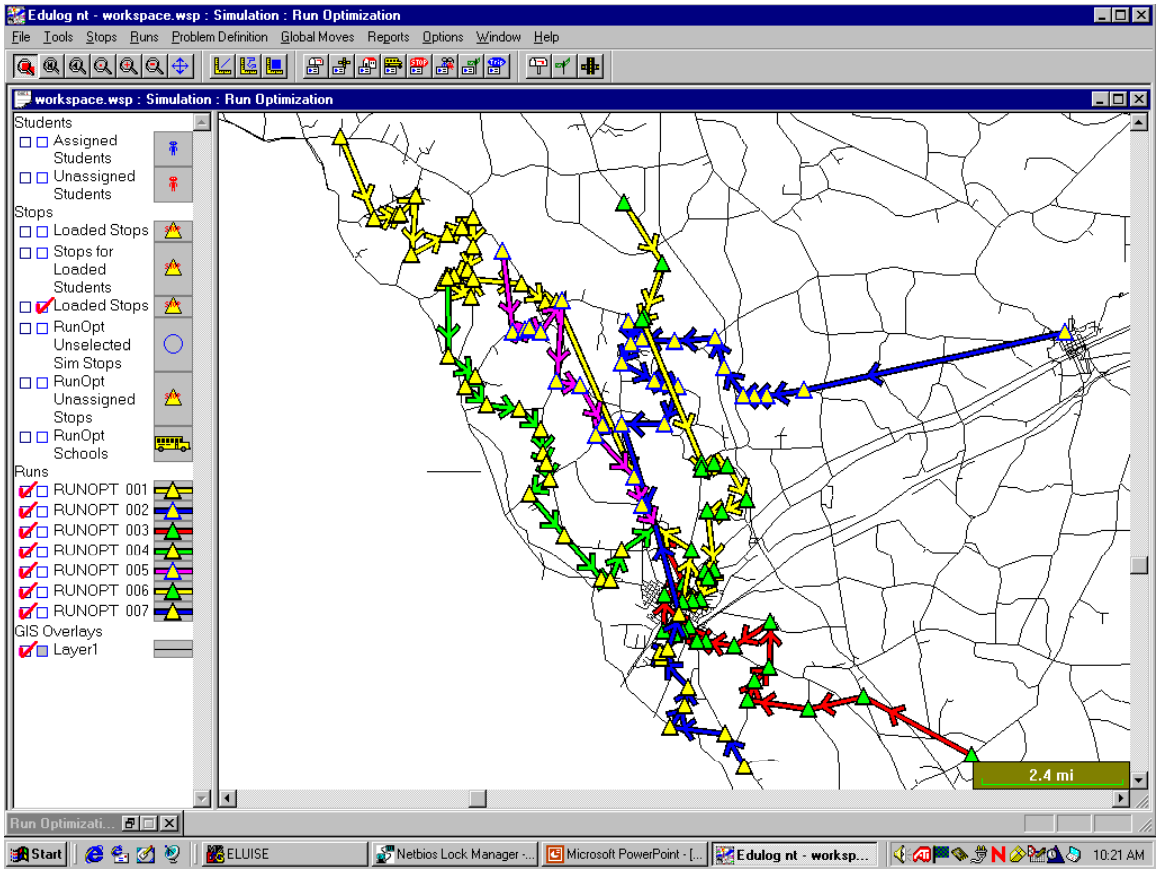
- Click on Add
- You can enter several different sets of buses/capacities before clicking OK
- Buses/capacities will appear in the right window

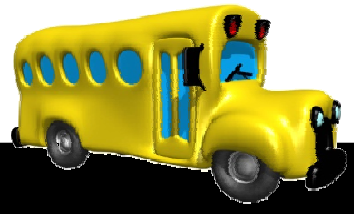




Runs!

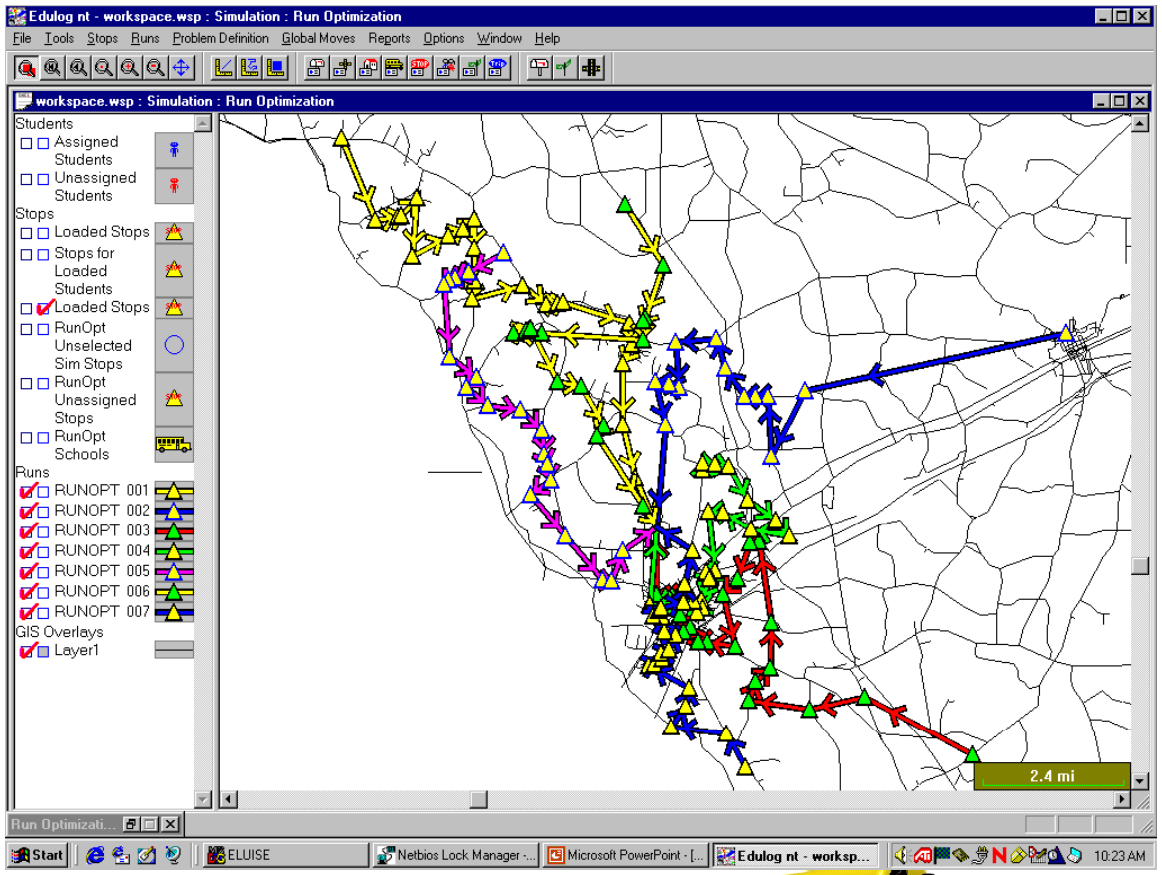
Runs are now available to work with





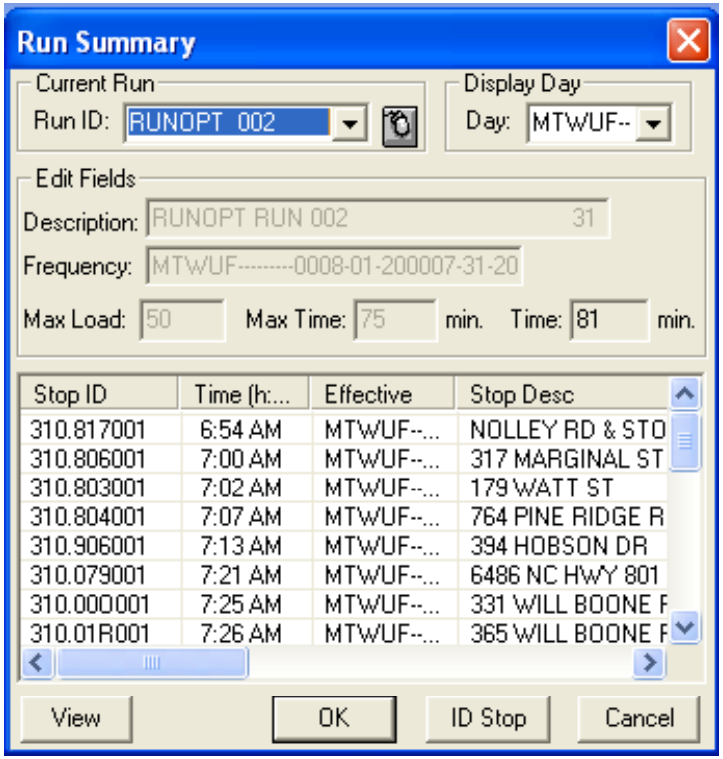
Global Moves>Improving Runs

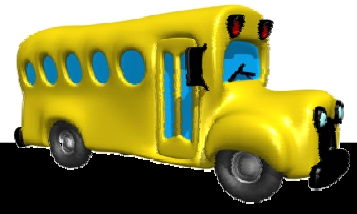
- Use the Improve Runs function under Global Moves until no moves are made.
- Runs shown have been through 3 sets of the improve function.



Checking Runs

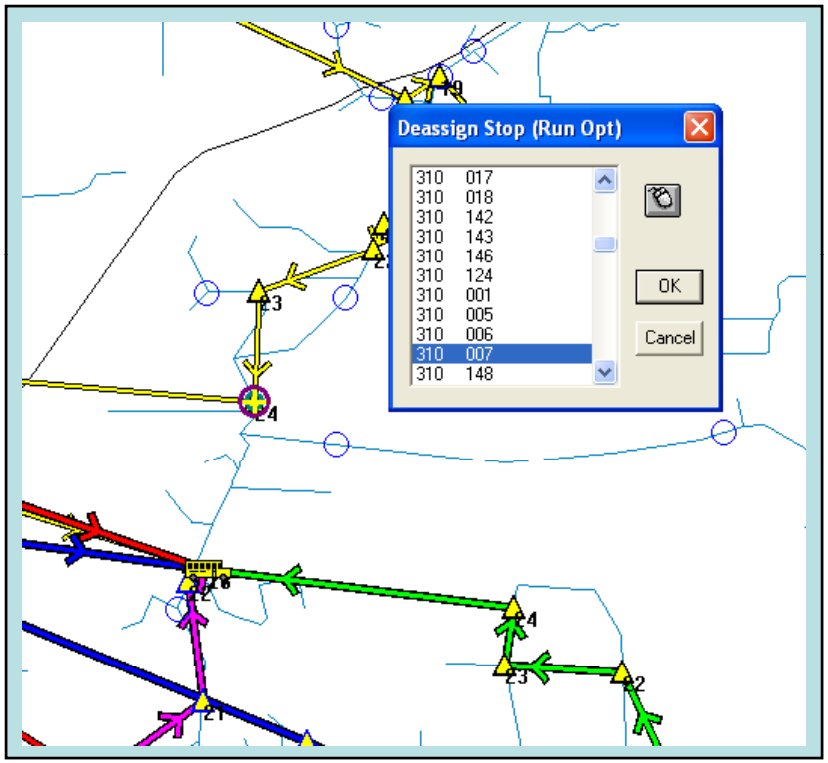
- Runs > Open Run Summary shows you stats about one run at a time
- Check each run by selecting the mouse and clicking on the run on the map, or select the run ID from the pull down menu

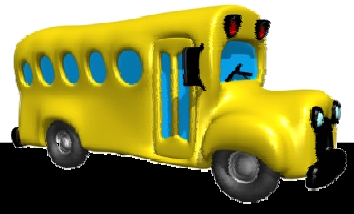




Making Edits to Your RUNOPT Runs

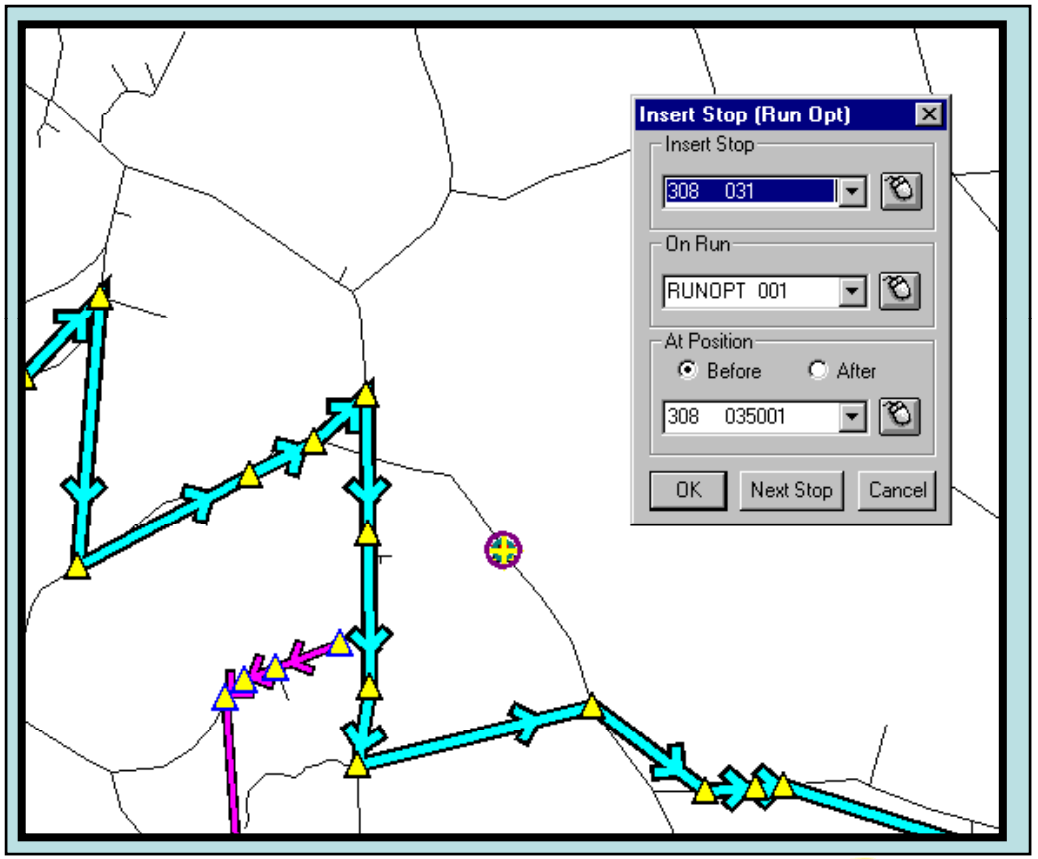
Stops > Deassign allows you to remove several stops at once.

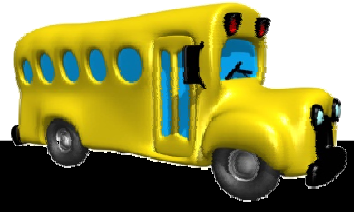




Inserting Stops On New Runs

- Inserting stops within run OPT is not very refined at this time
- Once you insert, you can run “improve runs” to make better sequences



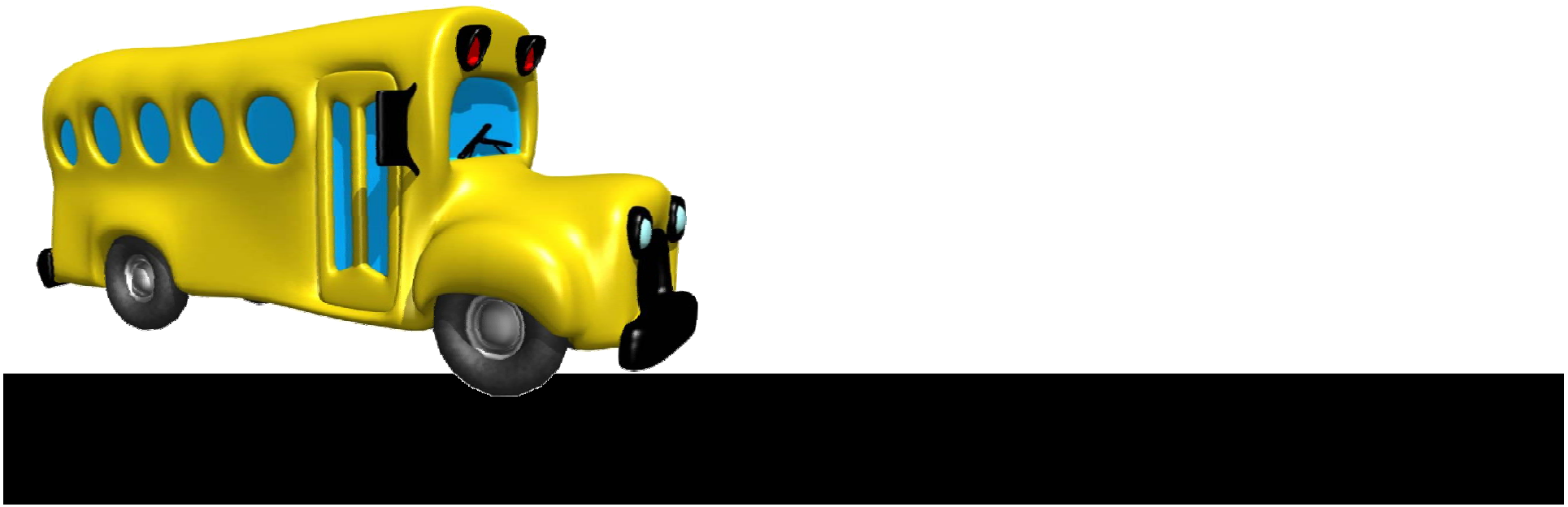


Saving OPT Runs to Simulation

- Saving runs back to simulation will allow you to make edits easily
- Once you do this, you must confirm your changes from the first session of run OPT to a file or your data before you can re-enter run OPT

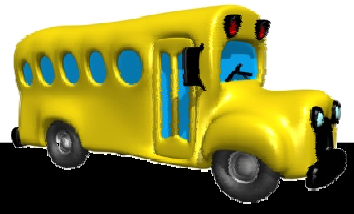
Making Additional Manual Modifications in Simulation

This portion functions like standard EdulogNT.



Make Sure

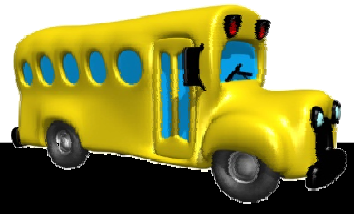
- Once you have confirmed your runs from Simulation back into your real data, **YOUR REAL DATA IS CHANGED!**
- You can only go back if you have a good **BACKUP!**



Recap

How You Should Use Run OPT

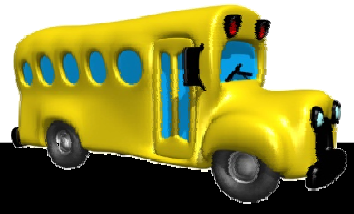
- You should think of OPT as a tool to be used as part of simulation
- It will give you a starting point for a particular set of runs
- Simulation allows you to continue to work with the runs to clean them up and make other needed edits

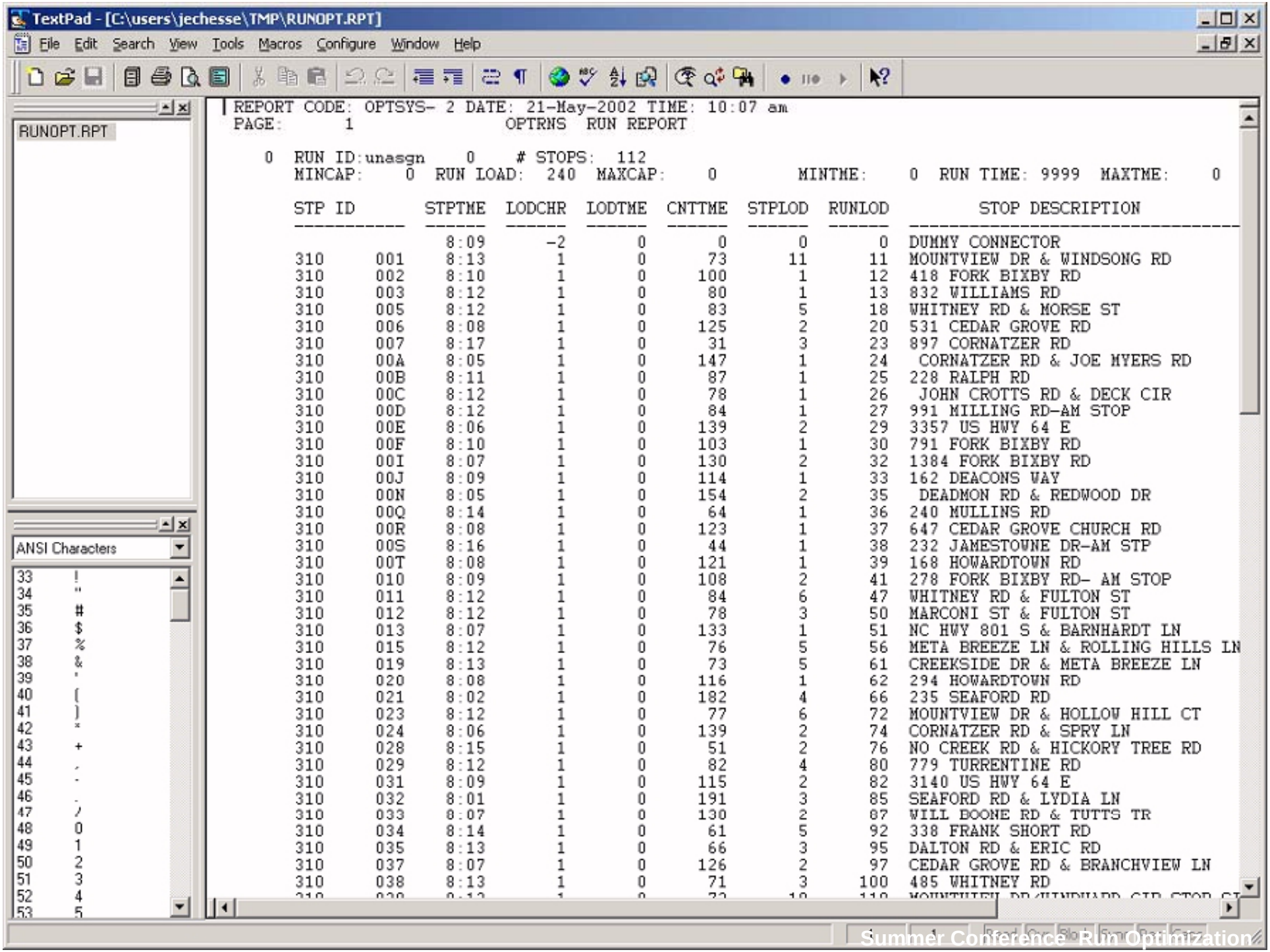


Recap

What You Do Where

- Optimization – Basic run generation, de-assigning and reassigning stops
- Simulation – Local moves with improved run data (no actual run directions, but time estimates in easier to use format)
- Regular Data – Real run directions and edits to run directions and reports!

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File Edit Search View Tools Macros Configure Window Help
RUNOPT.RPT
ANSI Characters
33 !
34 "
35 #
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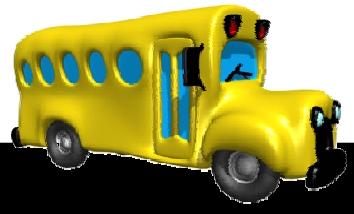
53 5
REPORT CODE: OPTSYS- 2 DATE: 21-May-2002 TIME: 10:07 am
PAGE: 1 OPTRNS RUN REPORT
0 RUN ID:unasgn 0 # STOPS: 112
MINCAP: 0 RUN LOAD: 240 MAXCAP: 0 MINTME: 0 RUN TIME: 9999 MAXTME: 0
STP ID STPTME LODCHR LODTME CNTTME STPLOD RUNLOD STOP DESCRIPTION
8:09 -2 0 0 0 0 DUMMY CONNECTOR
310 001 8:13 1 0 73 11 11 MOUNTVIEW DR & WINDSONG RD
310 002 8:10 1 0 100 1 12 418 FORK BIXBY RD
310 003 8:12 1 0 80 1 13 832 WILLIAMS RD
310 005 8:12 1 0 83 5 18 WHITNEY RD & MORSE ST
310 006 8:08 1 0 125 2 20 531 CEDAR GROVE RD
310 007 8:17 1 0 31 3 23 897 CORNATZER RD
310 00A 8:05 1 0 147 1 24 CORNATZER RD & JOE MYERS RD
310 00B 8:11 1 0 87 1 25 228 RALPH RD
310 00C 8:12 1 0 78 1 26 JOHN CROTTS RD & DECK CIR
310 00D 8:12 1 0 84 1 27 991 MILLING RD-AM STOP
310 00E 8:06 1 0 139 2 29 3357 US HWY 64 E
310 00F 8:10 1 0 103 1 30 791 FORK BIXBY RD
310 00I 8:07 1 0 130 2 32 1384 FORK BIXBY RD
310 00J 8:09 1 0 114 1 33 162 DEACONS WAY
310 00N 8:05 1 0 154 2 35 DEADMON RD & REDWOOD DR
310 00Q 8:14 1 0 64 1 36 240 MULLINS RD
310 00R 8:08 1 0 123 1 37 647 CEDAR GROVE CHURCH RD
310 00S 8:16 1 0 44 1 38 232 JAMESTOWNE DR-AM STP
310 00T 8:08 1 0 121 1 39 168 HOWARDTOWN RD
310 010 8:09 1 0 108 2 41 278 FORK BIXBY RD- AM STOP
310 011 8:12 1 0 84 6 47 WHITNEY RD & FULTON ST
310 012 8:12 1 0 78 3 50 MARCONI ST & FULTON ST
310 013 8:07 1 0 133 1 51 NC HWY 801 S & BARNHARDT LN
310 015 8:12 1 0 76 5 56 META BREEZE LN & ROLLING HILLS LN
310 019 8:13 1 0 73 5 61 CREEKSIDE DR & META BREEZE LN
310 020 8:08 1 0 116 1 62 294 HOWARDTOWN RD
310 021 8:02 1 0 182 4 66 235 SEAFORD RD
310 023 8:12 1 0 77 6 72 MOUNTVIEW DR & HOLLOW HILL CT
310 024 8:06 1 0 139 2 74 CORNATZER RD & SPRY LN
310 028 8:15 1 0 51 2 76 NO CREEK RD & HICKORY TREE RD
310 029 8:12 1 0 82 4 80 779 TURRENTINE RD
310 031 8:09 1 0 115 2 82 3140 US HWY 64 E
310 032 8:01 1 0 191 3 85 SEAFORD RD & LYDIA LN
310 033 8:07 1 0 130 2 87 WILL BOONE RD & TUTTS TR
310 034 8:14 1 0 61 5 92 338 FRANK SHORT RD
310 035 8:13 1 0 66 3 95 DALTON RD & ERIC RD
310 037 8:07 1 0 126 2 97 CEDAR GROVE RD & BRANCHVIEW LN
310 038 8:13 1 0 71 3 100 485 WHITNEY RD

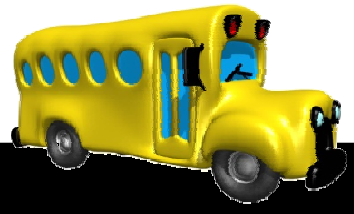
Run OPT Practice 2
Hints

- Double-check the numbers to make sure your data matches the example.
- If it doesn't, adjust your solution to match your situation.
- Go ahead and save a preliminary solution, then save periodically to new names as you make progress – that way, you can go back to various stages and try different strategies



Run OPT Practice 2
Hints

- Practice checking the status of your manual changes by going to **Runs > Open Run Summary**, scrolling over to the run load columns.
- Periodically check the overall status of runs by going to **Reports > Generate Solution Reports.**



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Run Optimization

Using Simulation to Develop

More Efficient

Bus Runs