



Daily Route Optimization of Service and Delivery Fleets

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Yale Electric and Appliance

- ▶ Family owned operated since 1923
- ▶ New England's leading appliance and lighting retailer, 25% annual growth
- ▶ 'Best of Boston' 2004 and 2005
- ▶ Ten 28' trucks with driver and helper teams making about 150 deliveries each day
- ▶ Thirteen service vans with a single technician making about 100 repairs each day

Core Technology and Data

- ▶ Mixture of Sun and Microsoft Servers
- ▶ Windows Network
- ▶ GERS Retail System
- ▶ Oracle database

Pre-project Routing Process

- ▶ Print 'tickets' for delivery and service orders
- ▶ Look up addresses on paper maps and note map page numbers (for driver reference)
- ▶ Sort tickets by pre-set zones (large day-to-day volume variance)
- ▶ Sequence tickets manually based on dispatcher knowledge of geography
- ▶ Use number of tickets as a surrogate for vehicle capacity (cube, drive time, service time, etc. not considered)
- ▶ Develop ETAs and service time windows estimates based on sequence and dispatcher guess, then enter results manually in GERS

2003 Business Challenge

- ▶ To develop more cost and service efficient routes and schedules for delivery and service fleets on a daily basis
- ▶ Cost related goals
 - Maximize cube utilization of delivery vehicles
 - Maximize driver and tech work day
 - Reduce miles and overtime
 - Reduce administrative time
- ▶ Service related goals
 - Provide more accurate ETA's and time windows to clients
 - Honor 'pre-committed' time windows
 - For repairs, make sure tech has the right skill to do the job and that same tech is used for follow-ups
- ▶ Integrate solution with GERS system

Solution Components

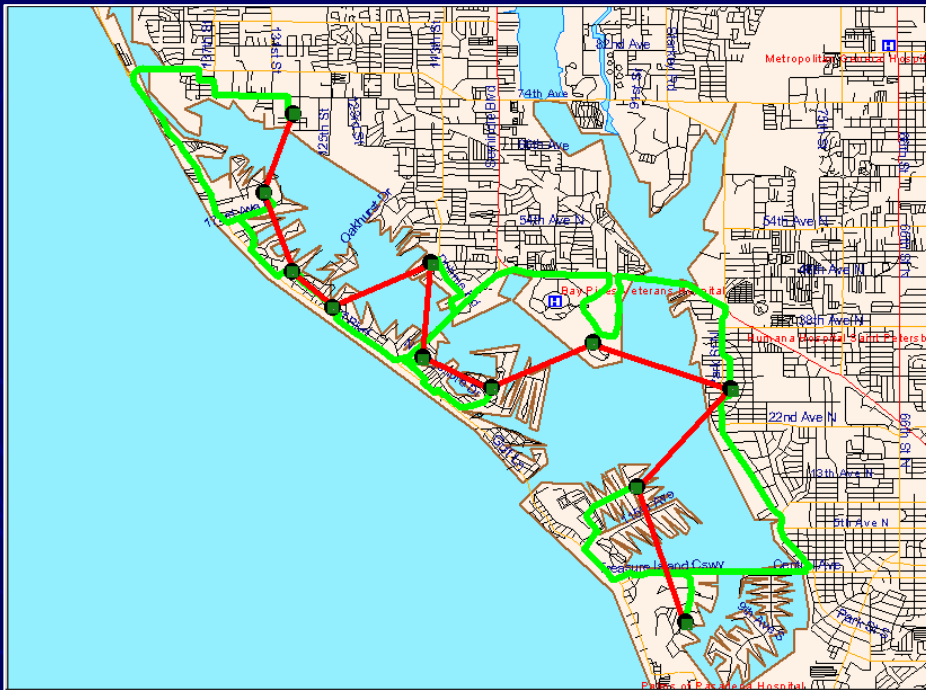
- ▶ Two seats licenses of ESRI's ArcLogistics Route software
- ▶ GDT Dynamap street data (included with the ArcLogistics Route licenses)
- ▶ Custom ALR-GERS Interface programs (one for product deliveries and one for service repairs) by Pathfinder Logistics Solutions
- ▶ Cloudberry GPS System

ArcLogistics Route

- ▶ A desktop application that optimizes vehicle routing and scheduling for an entire fleet
- ▶ Considers factors such as vehicle capacities, vehicle costs, delivery windows, driver length of day, time at office, lunches, etc.
- ▶ Utilizes the actual street network (speed by class of highway, one way streets, etc.)

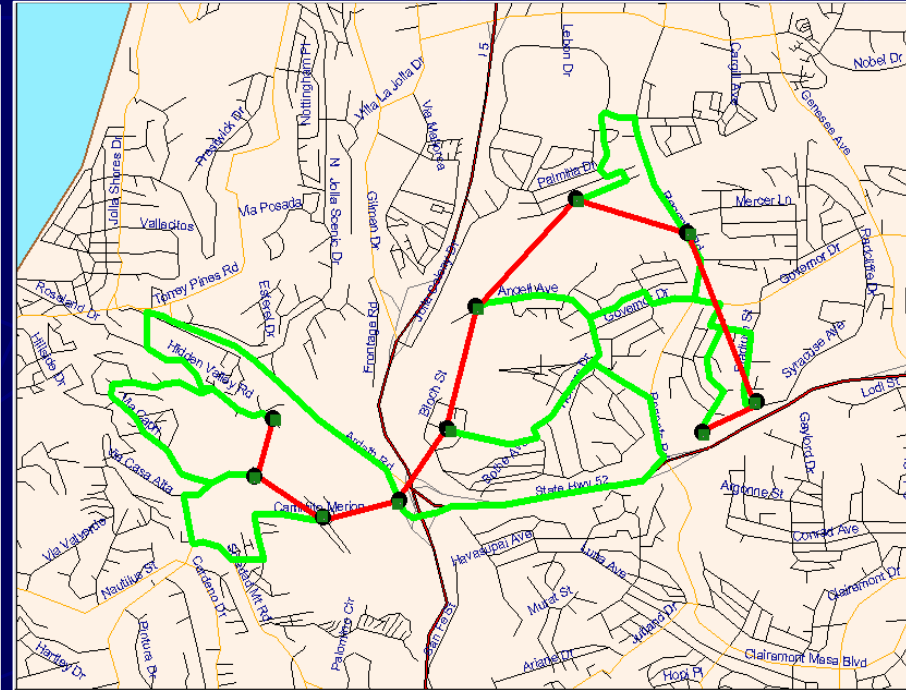
Why 'Real Streets' Matter!

St. Petersburg - Waterways



10 miles as the crow flies
26 miles actual

San Diego - Canyons



3.9 miles as the crow flies
16.3 miles actual

ArcLogistics Route Advantage

- ▶ Robust geographic data – real streets, one-ways, customizable, etc.
- ▶ Sophisticated optimizer/solver, more than just an assignment tool
- ▶ Powerful geocoding capabilities, easy-to-use tools to manage exceptions
- ▶ Superior look and feel, drop and drag, etc.
- ▶ Integrates with Cloudberry, a fully functional GPS/AVL system
- ▶ Backed by ESRI, an industry leader

ALR-GERS Interface - Delivery

▶ Multiple Downloads

- Selects orders and item detail by date and zone, aggregates orders with same customer number and address into stops
- Synchronizes to central database with each download, highlights changes
- Order and inventory details are viewable through routing program, user can view last 10 sales comments

▶ Multiple Uploads

- Creates user-defined time windows based on ETA's for each order
- Updates GERS by sales order (ETA, vehicle, stop, sequence, time windows)
- Marks orders when time window is revised so customers can be recalled

ALR-GERS Interface - Service

▶ Download

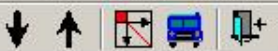
- Selects service orders by date and zone
- Service orders contain skill codes required by tech
- Queries historical service order database by customer to determine last tech
- Assigns minutes of service by service type code
- Skill codes and last tech are imported as order 'specialties' to the routing system to insure work orders are matched to appropriate technicians

▶ Upload

- Creates user-defined time windows based on ETA's for each order
- Updates service scheduling screens in GERS – schedules and closes completed services orders

New Routing Process

- ▶ Import delivery orders from GERS
- ▶ Review and resolve Geocoding exceptions
- ▶ Automatically build routes
- ▶ Export results to GERS
- ▶ Print management reports, manifests, maps and directions
- ▶ Upload to Cloudberry GPS



Download View

Download From GERS

Date: 9/28/2000 Thursday

Zones:

Available Zones:		Selected Zones:
13M	>	M-S
13R	<	R/S
13T	>>	THU
24F	<<	X-S
24M		
24T		
24W		
2FR		

Routing Folder:

Folder: Test Data

Remove existing orders

Download History... OK Cancel

Jordan's Furniture

10 orders selected from GERS.
 50 pieces selected from GERS.
 4 records added to ArcLogistics.

OK

Review Geocoding

The screenshot displays a geocoding application window titled "Geocode Address". The interface is divided into several sections:

- Input Fields:** Name: WYLY, ANDREW; Stop Type: Multi-Ticket Stop; Address: 3700 COLE AVE #361; City: DALLAS; State: TX; Postal Code: 75204.
- Current Candidate:** Standard Address: 3700 COLE AVE, DALLAS, TX, 75204.
- Table of Candidates:** A table with columns for Score, Left Side, Right Side, Street, City, Postal, and ST. The top row has a score of 100 and lists "COLE AVE" in "DALLAS, TX 75204".
- Map:** A street map of Dallas, TX, with a red dot indicating the location of 3700 Cole Ave. A red arrow points from the table to this dot.

Two red callout boxes with white text are overlaid on the image:

- 1. Scores address data:** A red arrow points from this box to the top row of the candidate table.
- 2. Places address locations on map:** A red arrow points from this box to the red dot on the map.

At the bottom of the window, the following address and coordinates are displayed:

3768 BROWN ST
DALLAS, TX
75219

X: -96.8118
Y: 32.8059

Automatically Build Routes

The screenshot displays the ArcLogistics Route software interface. The main window is titled "05-11-2004 (600457235) Truck 05 Route". It features a menu bar (File, Edit, View, Solve, Reports, Window, Help), a toolbar, and a sidebar with a tree view of the project structure. The central area is divided into three panes:

- List View (05-11-2004 (600457235): Route for Truck 05):** A table listing stops with columns for ETA, Description, Name, Address, Postal, Pt., Cube, and Ser... The data includes stops for DC Warehouse, Susan Webb, Theresa Ward, Paula Corrigan, Jim/Corde Smith, Molly Adams, Marg Degeeter, Amy Heritage, RA Christensen, J. Twyford-Silvis, Mark Johnson, Lunch, Tere Herrmann, Amy McMillin, Cin Stephensson, Frank/Julie Chang, Jeff/Gurney, B. Collinsworth, and Barbara Robbins, all ending at the DC Warehouse.
- Map View (05-11-2004 (600457235)):** A map showing the geographic distribution of stops and the routes assigned to each truck. The routes are color-coded to match the list view. Major roads like USHY 69, USHY 75, USHY 80, and USHY 175 are visible.
- Time View (05-11-2004 (600457235)):** A Gantt chart showing the schedule for seven trucks (Truck 01 to Truck 07) from 8 AM to 2 PM. Each truck's route is represented by a horizontal bar with colored segments corresponding to the stops in the list view.

Red arrows point from the list view to the map view and from the time view to the list view, indicating the flow of information and the relationship between the different views.

1. Develops optimal delivery plan for each vehicle

2. Designs routes using actual street network

3. Calculates accurate drive times, ETA's and length of driver's day



Truck 01 Route

- Service Area
- Locations
- Vehicles
- Stops Inbox
- Routing Folders
 - Test Data
 - Unassigned Stops
 - Routes
 - Truck 01
 - Truck 02
 - Truck 03

Accessing Order and Inventory Detail

Map View :

- Display Detail Screen
- Edit Address
- Unassign F8
- Assign to Route
- Geocode Address... Ctrl+G
- Move To...
- Set Priority
- Specialties...
- Grace...
- Lock
- Unlock
- Delete
- Cut Ctrl+X
- Copy Ctrl+C
- Paste
- Properties...

List View (Route for Truck 01)

ETA	Time Window	Name	Postal	Pieces	Cube	Value	Duration	Description
6:00:00 AM	Wide Open	Wareh						
7:14:00 AM	7:00:00 AM - 10:00...	Custo						
9:11:00 AM	7:00:00 AM - 10:00...	Custo						
9:23:00 AM	7:00:00 AM - 10:00...	Customer 3	7 PIGEON RD, WOBURN	34	0	13644	36	0923003\F...
9:59:00 AM	9:00:00 AM - 12:00...	Customer 3	7 HOLTON ST, WOBURN	6	0	2519	8	0923005RF...
10:07:00 AM		Lunch					20	
11:06:00 AM	Wide Open	Warehouse	100 Stockwell Drive, Avon					

1 Stop(s) Selected

Stop



Service Area

- Service Area
 - Locations
 - Vehicles
 - Stops Inbox
 - Routing Folders
 - Test Data
 - Unassigned Stops
 - Routes
 - Truck 01
 - Truck 02
 - Truck 03

Map View :

mi

Detail Can Include Sales Comments

Sales Order Detail

GERS Order: 3 of 7

Order Information:

Order No: 0923005RFP7
 Type: SAL
 P/D: D
 Customer: JAMES TRANIELLO
 Address: 7 PIGEON RD
 City: WOBURN
 State: MA
 Zip: 01801

Comments:

Last delivery was late, customer irate
 Second floor delivery
 Call when 15 minutes away

Quantity	SKU	Description	Cube	Value	Duration
1	985444442	LAMP	0.01	54.00	1
2	501170601	LAMP	0.02	578.00	2
3	500170600	BRASS	0.03	1,887.00	3
6			0.06	2519.00	6

OK



Value	Duration	Description
0		
2396	6	0209005HS...
2519	8	0923005RF...
13644	36	0923003XF...
2519	8	0923005RF...
20		
0		



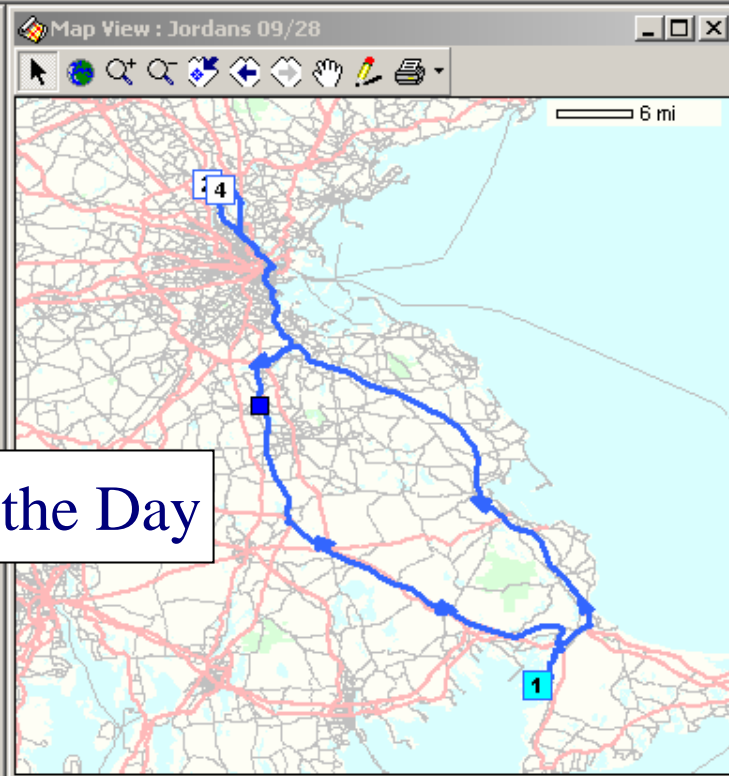
Jordans 09/28 Truck 01 Route

Service Area

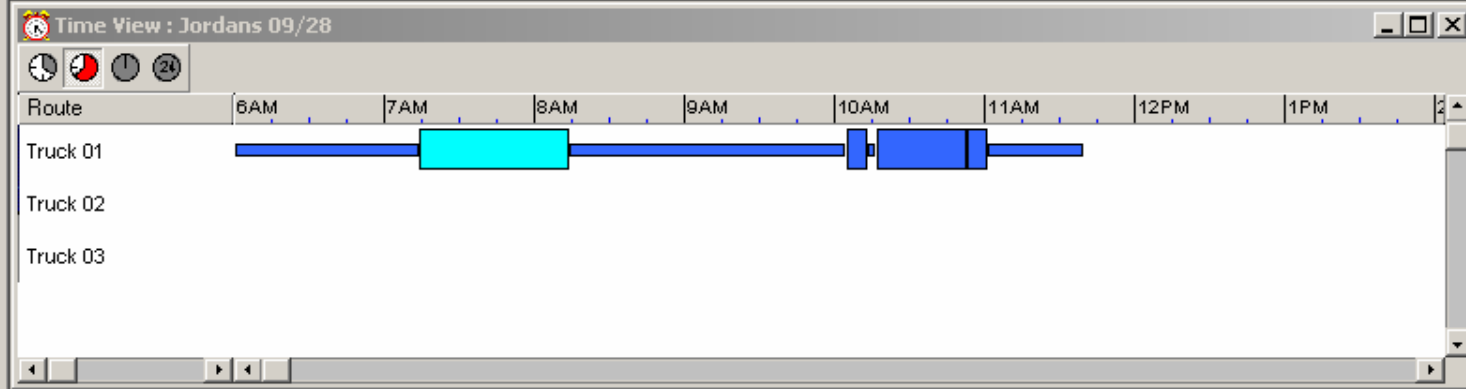
- Locations
- Vehicles
- Orders Inbox
- Routing Folders
 - THURSDAY01/10
 - Thursday ALR Solution
 - Thursday ALR Solution No OT
 - Jordans 09/28
 - Unassigned Orders
 - Routes
 - Truck 01
 - Truck 02
 - Truck 03

List View (Jordans 09/28): Route for Truck 01

Arri...	Description	Customer No.	Name
6:00:00 AM			Jordan's Avon
7:14:00 AM	0209005HSBB-SAL	MASDA	JEAN MASON
10:05:00 ...	0923005RFP4-SAL	TRAN7A12...	ED TRANIELLO
10:17:00 ...	0923003XFHL-CRM;09...	TRAN7A	JAMES TRANI...
10:53:00 ...	0923005RFP4-SAL	TRAN7A12...	JOE TRANIELLO
11:40:00 ...			Jordan's Avon

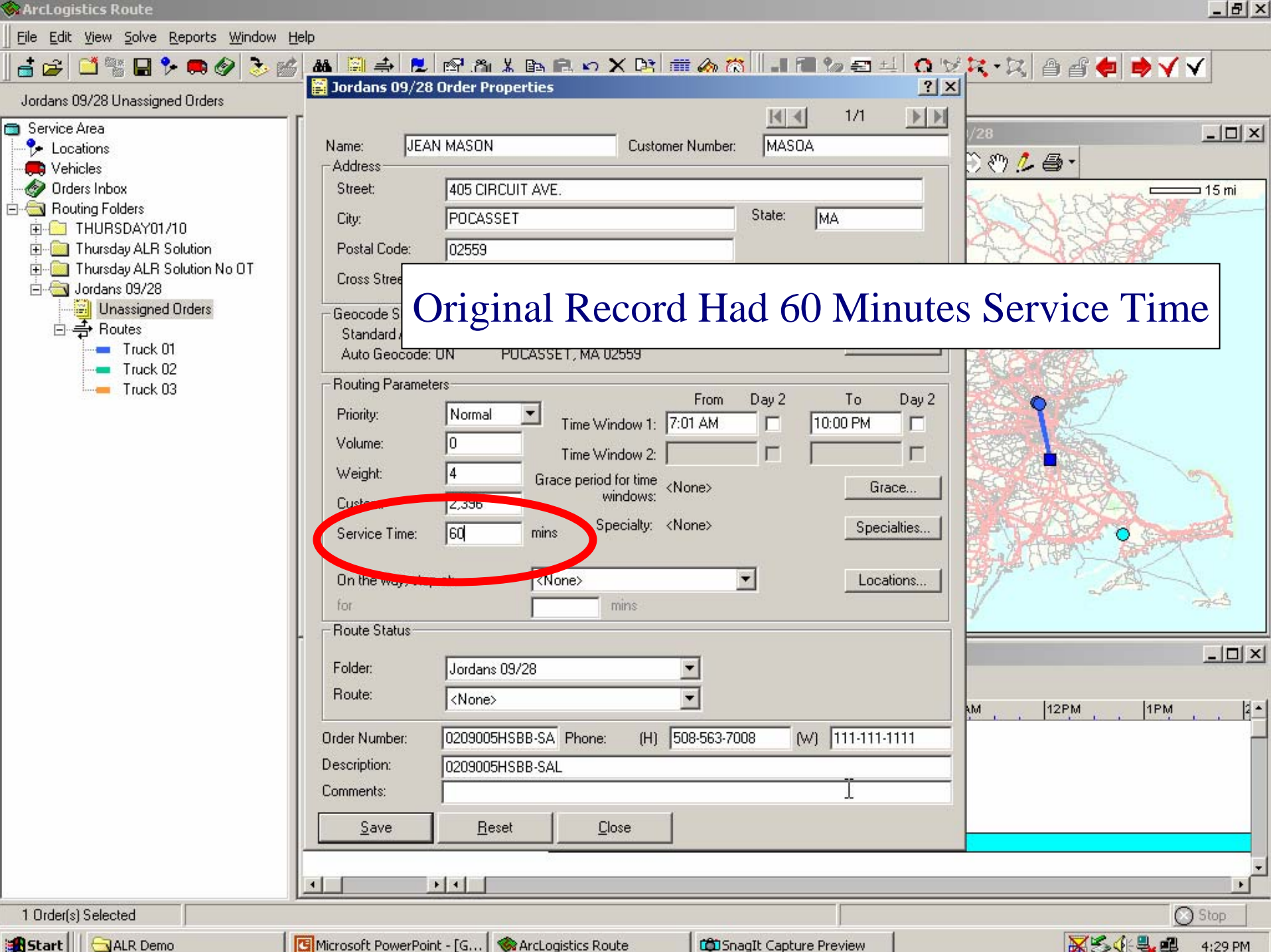


Import and Route Early in the Day



1 Order(s) Selected

Stop



Original Record Had 60 Minutes Service Time

60 mins

Save Reset Close

Jordans 09/28 Unassigned Orders

- Service Area
 - Locations
 - Vehicles
 - Orders Inbox
- Routing Folders
 - THURSDAY01/10
 - Thursday ALR Solution
 - Thursday ALR Solution No OT
 - Jordans 09/28
 - Unassigned Orders
 - Routes
 - Truck 01
 - Truck 02
 - Truck 03

Description	Customer ...	Name	Address	Postal	Servi...	Volu...	Custom	Comments
0209005HSBB-SAL	MASDA	JEAN MASON	405 CIRCUIT AVE., POCAS...	02559	6	0	2398	CHG, Truck 01, 7:14:00 AM

When There Is A Change In Cube or Service Time, Stops Are Unassigned and Highlighted



Service Area

- Service Area
 - Locations
 - Vehicles
 - Stops Inbox
 - Routing Folders
 - Test Data
 - Unassigned Stops
 - Routes
 - Truck 01
 - Truck 02
 - Truck 03



Update ALR Time Windows

Folder: Test Data

There are 4 ALR orders with default delivery times.

Update Ignore Cancel

List View

ETA	Time Win	Postal	Pieces	Cube	Value	Duration	Description		
6:00:00 AM	Wide Open					0			
7:14:00 AM	7:01:00 AM - 10:00...	Customer 1	405 CIRCUIT AVE., POCASSET	02559	4	0	2396	6	0209005HS...
9:11:00 AM	7:01:00 AM - 10:00...	Customer 2	7 OCEAN ST, WOBURN	01801	6	0	2519	8	0923005RF...
9:23:00 AM	7:01:00 AM - 10:00...	Customer 3	7 PIGEON RD, WOBURN	01801	34	0	13644	36	0923003XF...
9:59:00 AM	7:01:00 AM - 10:00...		7 HOLTON ST, WOBURN	01801	6	0	2519	8	0923005RF...
10:07:00 AM		Lunch						20	
11:06:00 AM	Wide Open	Warehouse	100 Stockwell Drive, Avon	02322					

4 Items



Time Window Maintenance

Time Window Values

ETA		ALR Time	
From	To	From	To
07:00 AM	07:30 AM	07:00 AM	10:00 AM
07:31 AM	08:00 AM	07:00 AM	10:00 AM
08:01 AM	08:30 AM	07:00 AM	10:00 AM
08:31 AM	09:00 AM	07:00 AM	10:00 AM
09:01 AM	09:30 AM	07:00 AM	10:00 AM
09:31 AM	10:00 AM	09:00 AM	12:00 PM
10:01 AM	10:30 AM	09:00 AM	12:00 PM
10:31 AM	11:00 AM	09:00 AM	12:00 PM
11:01 AM	11:30 AM	09:00 AM	12:00 PM
11:31 AM	12:00 PM	11:00 AM	02:00 AM
12:01 PM	12:30 PM	11:00 AM	02:00 PM
12:31 PM	01:00 PM	12:00 PM	03:00 PM
01:01 PM	01:30 PM	12:00 PM	03:00 PM
01:31 PM	02:00 PM	12:00 PM	03:00 PM
02:01 PM	02:30 PM	12:00 PM	03:00 PM
02:31 PM	03:00 PM	01:00 PM	04:00 PM
03:01 PM	03:30 PM	01:00 PM	04:00 PM
03:31 PM	04:00 PM	02:00 AM	05:00 AM
04:01 PM	04:30 PM	02:00 PM	05:00 PM
04:31 PM	05:00 PM	03:00 PM	06:00 PM
05:01 PM	05:30 PM	03:00 PM	06:00 PM
05:31 PM	06:00 PM	03:00 PM	06:00 PM

Reset to Default

Cancel



Select Sub IDs and Upload

Upload to GERS

Folder: Test Data

Delivery Date: 9/28/2000

Entire Folder

Substitutes	
Truck	Substitute
Truck 01	TH01

OK Cancel

Jordan's Furniture

10 orders uploaded to GERS

OK

Upload to Cloudberry Manage Actual Vs. Plan

Tracker Properties

General | Map Layers | User Layers | Mobile Unit Groups | Routes

Route to Display:

- [-] Folder 5-28
- [-] Bob 1
- [+] 19 - ALR Demo
- [+] 494 - AutoStatus Test
- [+] 1429 - Bob's Demo
- [+] 1516 - New Folder
- [+] 10473 - 12/8/03 - Date
- [+] 10508 - Bob 4 Folder
- [+] 10509 - Bob 5 Folder
- [+] 10510 - Bob 6 Folder
- [+] 10587 - New Folder 5

Enable Routing Features

Options... Apply

Route Stop List

Seq #	Order #	Name	Address	City	State	Zip	Status	Sched Arr	Act Arr	Act D
2	18	KELLY PAPER	4431 CORPORATE DRIVE	LOS ALAMITOS	CA	90726	Completed	5:25 AM		
2	22	AIRPORT MARINA	11160 S HARBOR AVE	LOS ANGELES	CA	90045	Completed	7:08 AM	12:11	
4	22	A-1 OFFICE EQUIPMENT	13716 S HAWTHORNE BL	HAWTHORNE	CA	90250	Completed	7:52 AM		
5	22	JAPAN OFFICE SERVICE	20055 S WESTERN AVE	TORRANCE	CA	90501	Completed			
8	22	OFFICE DEPOT #1225	2305 E WILLOW ST	IRVING	CA	92718	Completed	8:29 AM		
8	22	DISCOUNT EQUIPMENT CO.	19800 SUSANA ROAD	COMPTON	CA	90221	Completed	10:18 AM	12:11	
10	22	DELPHI COMP	14900 LAKEWOOD BLVD	BELLFLOWER	CA	90706	Completed	10:58 AM		
11	12	HARRIS'S STATIONERS	6220 SANTA FE AVE	HUNTINGTON PARK	CA	90726	Completed	11:46 AM	09:24 AM	09:25
2	26	CANYON OFFICE SUPPLIES	381 OAK PLACE	BREA	CA	90821	Pending	1:03 AM	05:50 PM	
3	26	COPY PRINTING SOLUTIONS	187 W ORANGETHORPE	PLACENTIA	CA	90871	Completed	1:48 AM		
4	30	ECORD NATIONAL DIS	1814 E 17TH STREET	SANTA ANA	CA	92701	Completed	2:22 AM		
5	30	AMERICAN WAREHOUSE	14840 RITCHIE	SANTA ANA	CA	92708	Completed	3:08 AM		
6	10	CITY DATA SUPPLY, INC.	3512 W LAKE CNTR DR	SANTA ANA	CA	92704	Completed	3:43 AM		
7	30	ALPHA STATIONERS	2323N TUSTIN AVE	SANTA ANA	CA	92706	Pending	4:28 AM	02:10 PM	02:11
8	31	APOLLO STATIONERS	1880N TUSTIN	ORANGE	CA	92665	Completed	5:25 AM		
10	13	SUPERIOR OP	13301 ALONDRA BLVD	SANTA FE SPRINGS	CA	90670	Completed	6:25 AM		
11	13	PACIFIC OFF PRODUCTS	14348 SHOEMAKER	SANTA FE SPRINGS	CA	90670	Completed	6:54 AM		
12	26	VIKING OFFICE PRODUCTS	18800 E FRODOAN WAY	LA MIRADA	CA	90826	Completed			
2	30	BEST OFFICE PRODUCTS	178 PACIFIC ST	POMONA	CA	91768	Pending	1:48 AM	02:31 PM	02:32
3	07	ELLSWORTH STATIONERS	1132 RANDOLPH AVE	GLENDORA	CA	91741	Completed	2:34 AM	05:50 PM	
4	07	DEPENDABLE	476 S VERMONT	GLENDORA	CA	91746	Pending	3:06 AM		

Route Schedule Compliance Report

Date Range: From: 1/1/2002 12:00:00 AM To: 1/1/2002 11:42:36 AM (Pacific Standard Time)

Route: 19 - ALR Demo

Name: Van 1	Arrival Date/Time		Service Time		Departure Date/Time		
	Actual	Scheduled	Early/Late	Actual	Early/Late	Actual	
STAPLES #116	7:36 AM	7:36 AM	0 mins	5 mins	7:41 AM	7:41 AM (5 mins)	
FARR'S STATIONERS #17	8:01 AM	8:01 AM	0 mins	5 mins	8:06 AM	8:06 AM (On Time)	
STAPLES #18	8:19 AM	8:19 AM	0 mins	15 mins	8:34 AM	8:34 AM (4 mins)	
STAPLES #117	8:55 AM	8:55 AM	0 mins	10 mins	9:05 AM	9:05 AM (8 mins)	
STAPLES #050	9:22 AM	9:22 AM	0 mins	10 mins	9:32 AM	9:32 AM (7 mins)	
FARR'S STATIONERS #18	9:22 AM	9:22 AM	0 mins	5 mins	9:27 AM	9:27 AM (2 mins)	
STAPLES #005	9:30 AM	9:30 AM	0 mins	5 mins	9:35 AM	9:37 AM (2 mins)	
STAPLES #182	10:11 AM	10:11 AM	0 mins	5 mins	10:16 AM	10:16 AM (5 mins)	
FARR'S STATIONERS #26	10:36 AM	10:36 AM	0 mins	7 mins	10:43 AM	10:43 AM (8 mins)	
STAPLES #003	11:31 AM	11:31 AM	0 mins	10 mins	11:41 AM	11:41 AM (7 mins)	
Arrival Time Average:		2 mins	Service Time Average:		8 mins	Departure Time Average:	8 mins
On Time Percentage:		50%	On Time Percentage:		90%	On Time Percentage:	80%
Missed/Skipped Route Stops:		Total Non-Route Stop Loler Time:		None			
FARR'S STATIONERS #12 OR-3 (Seq #: 12): 11919 VALLEY VIEW ST, GARDEN GROVE, CA, 92645 STAPLES #114 SF-18 (Seq #: 18): 8000 E PACIFIC COST, N LONG BEACH, CA, 90804 STAPLES #114 SF-19 (Seq #: 19): 2695 ARTESIA BLVD, BELLFLOWER, CA, 90707 FARR'S STATIONERS #9 SF-18 (Seq #: 18): 10222 E LAKEMOOD BL, DOWNEY, CA, 90244 STAPLES #124 F-9 (Seq #: 17): 3200 GARFIELD AVE, LOS ANGELES, CA, 90040 STAPLES #113 J-15 (Seq #: 15): 610 E VALLEY BLVD, ALHAMBRA, CA, 91800							

Name: Van 2 ID: 381

SUCCESS STATIONERS J-2 (Seq #: 2): 8913 VALLEY BLVD, ROSEMEAD, CA, 91770

STAPLES #107 SF-2 (Seq #: 3): 1450 S. MOUNTAIN AVE, DURANTE, CA, 91010

STAPLES #122 SF-3 (Seq #: 4): 1480 NORTH AZUSA, COVINA, CA, 91722

FARR'S STATIONERS #14 SG-4 (Seq #: 5): 1037 N GRAND AVE, COVINA, CA, 91724

Page 1 Loler Duration Key: 10 min << < 20 min << < 30 min << < 40 min << < 50 min <<

* Indicates Roll Up of Fragmented Loler

Benefits

- ▶ Streamlined administration (3 hours to 1 hour each day over a period when volume doubled)
- ▶ Improved fleet productivity (lower miles and overtime, more cube per vehicle)
- ▶ More accurate ETAs and time windows for customers
- ▶ Estimated first year savings:
 - About \$100K per year in delivery (one less vehicle and team)
 - About \$100K per year in service (handled about 20% more service orders with existing fleet)
- ▶ Installed, set-up, trained and went live in under two weeks!

Contact Information

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