map&guide mapserver functionality

Product:	map&guide mapserver 4
Subject matter:	map&guide mapserver functionality
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1 General Description of Functions

The mapserver technology is the basis of our complete range of Mapware products, especially map&guide - the professional route planner.

map&guide mapserver consists of individual software components which can be used to customise all the available functions for specific use cases. These mapserver components can be used in any situation which requires a simple and seamless integration of digital maps, route calculation or rapid validation and geocoding of addresses.

- Geocoding of address data
- Connection of address data from external databases
- Graphical representation of address data
- Creation of user-defined layers and tables
- Activation/deactivation of information layers using layer technology
- Selection of objects
- "Search for Next" and graphical display of route to next address
- Search within a corridor
- Search within an ellipse/circle or rectangle/square
- Adding user-defined objects manually (map editor layer)
- Print the map
- Displaying any number of maps simultaneously
- Show temporary objects
- Show scale and compass point
- Zooming and moving the map
- Simultaneous support of various coordinate formats
- Distance calculation between two locations
  (shortest or quickest route)
- Specification of departure and arrival times
- Calculation of alternative routes
- Define speed profiles
- Sequence optimisation
- Consideration of toll roads, breaks and stay times
- Calculation of route with several stop-off points
- Save routes, maps and positions
- Calculation of distance matrix
  (road conditions e.g. consideration of road closures during route calculation)
- Generation of itinerary (detailed list, start/end, important points on route)
- Calculation of journey time and costs

2 Basic Functions (Map Display and Geocoding)

2.1 Addresses

Address information is accumulated in many companies. If you also provide the geographical positions for these addresses, then they can be used in other areas of application, e.g. routing, area analysis etc.

The geocoder object offers functions for checking the correctness of address data and assigning geographical coordinates to the data so that they can be displayed on a map.

- Editing/correcting addresses
  (in the table; is performed using application development)
- Geocoding addresses
  (phonetically, house number exact; geocoder function)
- Resolve address overlapping
  (automatic resolution of doubled addresses i.e. individual objects can be selected)
- Connection of Access or SQL server databases
  (e.g. *.txt file export, data as *.mdb, integration of data records using CreateGeoIndex – InsertGeoRecord)
- Import existing address layers
- Save the history list for geocoding queries

2.2 Layer (Properties)

- Create or add your own layers (table structures)
  (Create and insert an *mdb in the "Address" folder [consistent labelling e.g. p_ad7.adr])
- Communicate with individual layers
  (right-click with mouse - Properties)
- Dim layers
  (Properties – Dimming factor)
- Activate/deactivate layers (set to visible/invisible)
  (Properties – objects are generally visible)
- Delete layers
  (can be modified with source code)
- Define layer detail
  (Properties – detail level e.g. the magnification level at which roads are visible)

- Modify layer sequence
  (Properties – the sequence that the layers are displayed in can be changed)

2.3 Search Functions

- Generation of 12 different search flags => settings options depending on the search flag (actions for ambiguous result or if nothing is found)
- Ellipse search in a layer
  (on the map: Shift/Alt key / left-click with mouse within a circle, select objects e.g. POIs, locations)
- Search within a corridor
  (search for and display the nearest petrol stations to a calculated route)
- Search for Next within a layer
  (clicking on the map shows the nearest object, e.g. location or road [configurable via properties])
- Polygon/rectangle search in a layer
  (on the map: Shift key / left-click with mouse within a rectangle, select objects e.g. POIs, locations)
- Search for addresses/objects using text
  (enter a location or postcode and street, select directly on the map)
- Map display
- Display, define, manage, move, edit and delete standard objects such as polygons, circles, rectangles, arrows, lines, triangles, diamonds, pentagons, hexagons, stars, points, texts, bitmaps, colours and lines (map editor)
- Set fill colour and border lines
  Automatic centring in the map window on the address searched for
  (the map is centred and focused on the address you have entered)
- Display several maps or multiple map views
- Directly position the map window on a particular map section
  (selecting a map section)
- Print the map
- Show temporary objects (only stored in RAM) by disconnecting the database
  (in map editor demo - Tests - Use Temporary Object)
- Set object visibility independently of zoom level
  (via Properties)
- Create and access map editor layers
  (see map editor)

- Export the map as a bitmap or Metafile
  (in KeTest: Tests ->Printing Test -> Bitmap Drawing to place the bitmap or Metafile in the clipboard)
- Define graphical filters, specify the shape, size and colour of the objects
  (address monitor: via Application)
  An unlimited number of graphical filters can be defined for a single address monitor layer. Of course, only one of these filters can be used to display data at any one time. This method is used to add a new graphical filter to the administration.
  If no definition for the graphical filter exists, then green points are created as the default value.
- Display house number areas
  (labels for house numbers e.g. up to 0.05 km)
- International map labels (according to country)
  (configurable in the *.ini files e.g. town.ini ‹ VisibleName = city ›)
- Graphical map display
- Set or change map folders
- Show scale and compass point
  (scale/compass and navigation rotation e.g. 30°)
- Scrolling and moving
- Spider diagram showing nearest address
- Various coordinate formats:
  Mercator, Pixel, Geodecimal, GeoMinSec, UTM, GK, Logical
  (Kernel)
- Zooming

2.4 Selection Functions

- Set "selectable" or "exclusively selectable" attribute for layers
  (configurable via Properties)
- Selecting objects
  (configurable via Properties)
- Labelling
- Show location labels
  (via Properties)
- Display Quickinfo for objects
  (via Properties - Basic Properties)
- Show road labels, road names
  (via Properties – Basic Properties - Labelling)

- Show road signs/labels
  (via Properties – Basic Properties - Labelling)

2.5 Routing

The routing module calculates the distance between two points.

This also includes sequence optimisation, alternative routes as well as a dynamic influence on the calculated routes.

- House number exact route planning in many European cities.
  RoutingTest: Functions of DistLib.dll (pd46nt.dll, pd50nt.dll)
- Specify departure and arrival times
  (IRouteOption::put_DateTime())
- Calculate alternative routes (maximum of four)
  (IRouteOption::put_AltRoutes(Default = 0, 1, 2 , Number of alternative routes))
- Distance calculation (shortest, quickest or most cost-efficient route)
  (TimeFaktor : 0 = shortest and 100 = quickest)
  Cost-efficient calculation = CalcTimeFaktor ())
- Define vehicle-specific profiles such as speed and restrictions
- Consider differences (in km) between stop-off points, breaks and stay times.
- Corridor search
- Account for toll roads throughout Europe
  (only maps such as Germany Extra or TLN contain these functions)
- Route optimisation with sequence optimisation
  (calculate optimal stop-off point sequence)
- Calculate route with several stop-off points (up to 100 points on route)
  (via batch control)
- Delete routes
- Make routes visible or invisible
- Account for traffic situation during route calculation
  (traffic jam, road closures)
- Create itinerary with journey information: roads, duration and costs
  (detailed list, start/end, important stop-off points)

- Calculation of journey time and costs

3 mapserver base modules

3.1 Modules

mapserver has been developed as a server consisting of many components. The following modules are available:

- map display, zoom and scroll functions (KE4.DLL)
- address search (KE4.DLL)
- collection of data for addresses, roads and areas (KE4.DLL)
- address monitor (AM4.DLL)
- route calculation - encapsulation of DISTLIB functions (RTG4.DLL)
- itinerary preparation (RTG4.DLL)
- geocoding (GCODE4.DLL)
- road editor (RE4.DLL)
- traffic data (TRAFFIC.DLL and TINLAYER.DLL) , Add-on module
- selection (SELNOTIF.DLL)
- display of areas (ME4.DLL)
- display of grid maps (RASTER.DLL), Add-on module

Some of these modules can be used individually, however some of them also build on KE4.DLL, the actual mapserver kernel. At present there are three keys for licencing:

- Map display
- Geocoding
- Complete route calculation

3.2 DLLs in the mapserv Folder

The DLLs required for a particular module must be identified as being available for common use.

List of all DLLs provided in the mapserv folder:

- AM4.dll COM address monitor registration required
- Bitmap32.dll Standard always
- DAPTVMPL.dll Standard, Add-on module
- GCODE.dll COM Geocoding
- GPS4.dll COM
- KE4.DLL COM Map display registration required
- MAPSERV.lic txt file for registration in Visual Basic
- ME4.dll COM
- RTG4.dll COM Routing registration required
- NMEA32.dll Standard
- NMEASM32.dll Standard
- PD50MAS.dll Standard
- RE4.dll COM
- RTG4.dll COM
- SELFNOTIF.dll COM
- SELNOTPS.dll COM
- TRKOORNT.dll Standard

The SDK contains the file setup.rul which serves as a template for creating the installation tool.

4 MapControl

The COM object MapControl represents the map display and manages all map views which display the special contents of these maps. This variant encapsulates the MapView function in one ActiveX component.

The MapView object contains the functionality for map navigation, administration of Quickinfos and geographical search queries.

4.1 Basic Functions

- Navigation within the map
  (Zoom in, Zoom out, Total View)
- Dim layers
  (Properties – Dimming factor)
- Activate/deactivate layers (set to visible/invisible)
  (Properties - objects are generally visible/selectable
- Delete layers
  (can be modified with source code)
- Define layer detail
  (Properties – detail level e.g. the magnification level at which roads are visible)
- Modify layer sequence
  (Properties – the sequence that the layers are displayed in can be changed)

5 mapserver Test Program

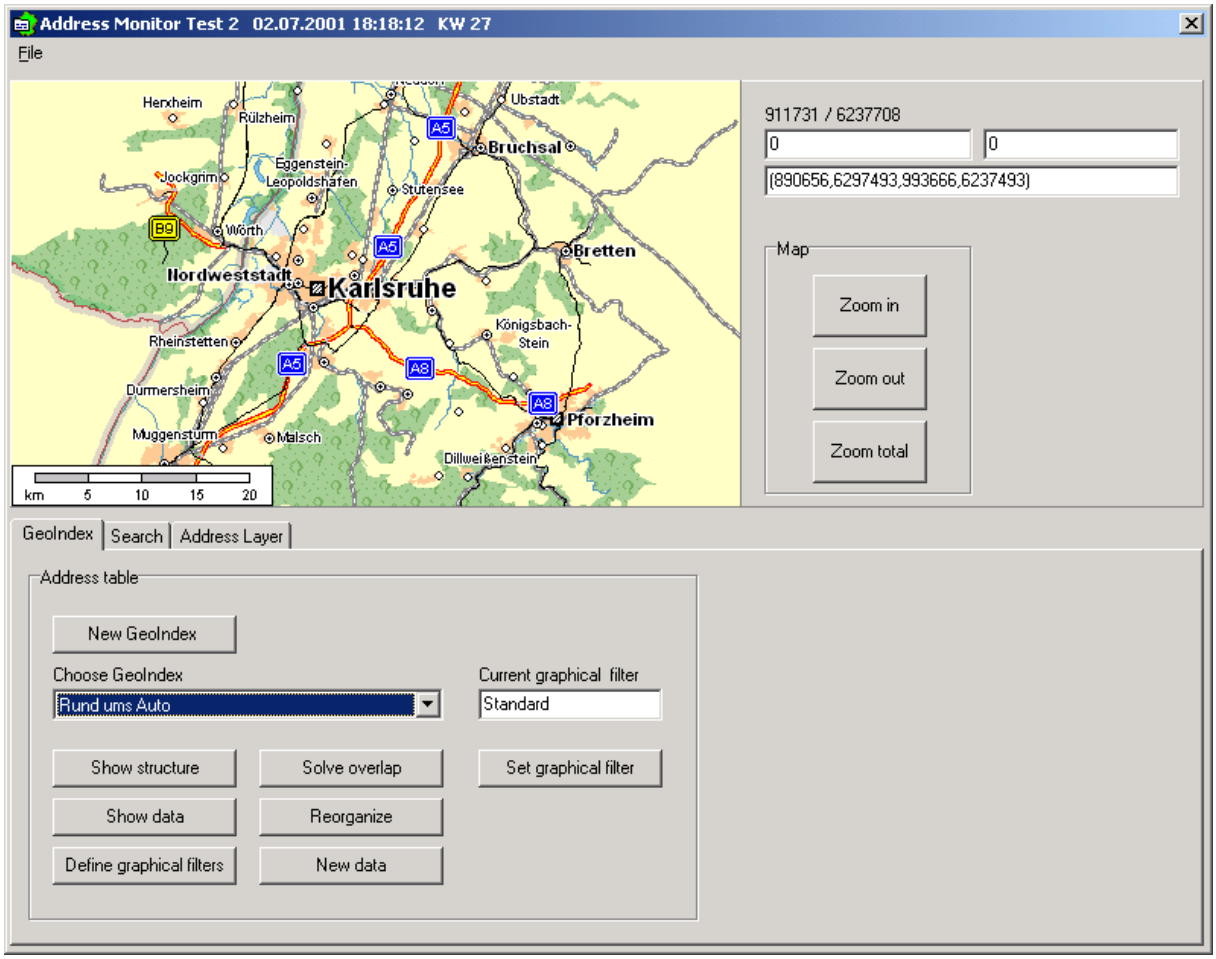
mapserver 4 can be configured and extended in any number of ways.

The base module delivers COM/DCOM objects. The program supports all common programming languages from C++, Delphi to Visual Basic/VBA.

The programming examples clearly demonstrate how individual functions can be built quickly and easily. Ready-made functions simplify the operation of mapserver without limiting its functionality.

5.1 address monitor Test Program

The Delphi demo supplied with the product uses MapControl as a map viewer. MapControl is not a necessary component for geocoding and implements the IGeocode interface externally by itself. This means all queries to this interface are simply forwarded to the geocoder. The geocoding results can be very easily controlled using this map viewer. If you use the sample program as the geocoder in the development phase, then you will be in the position to observe the work of the geocoder and you will be able to immediately spot any errors in the interface control.



address monitor test program

5.1.1 address monitor Functions

Display and administration of customer-specific address data records - the properties of these records can be highlighted using geographical filters.

- Edit, correct addresses (in the *.mdb table)
  ("New Data" button - create new data records)
- Resolve address overlapping
  (resolve overlap for doubled addresses - single objects can be selected
  "Solve overlap" button)
- Graphical representation of address data
  (Create and edit graphical filters using the "Define graphical filters" button)
- Automatic update of address layers
- Save the history list for geocoding queries
  (geoFlags =1 Addresses have been geocoded, how geocoding occurred)

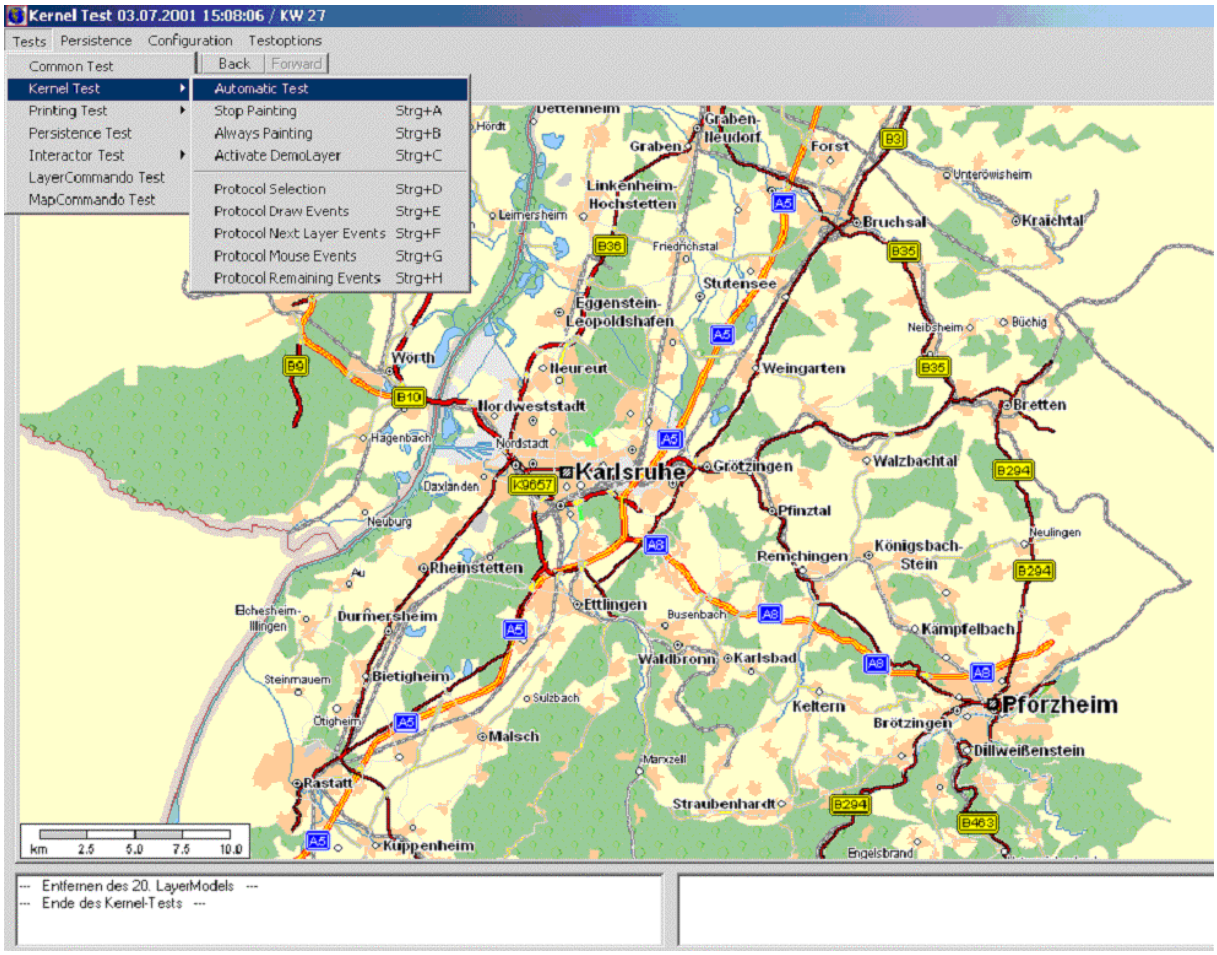
5.1.2 Layer (Properties)

- Create or add your own layers (table content structures)
  ("New GeoIndex" button)
- Communicate with individual layers
  ("Choose GeoIndex" button)
- Integrate and display existing address layers
  (integrate additional address layers [*.adr files] - these can be found in the default map server folder)
- Search for nearest addresses, polygons, ellipses, corridors and spiders is possible using
  the Search tab
- Search for addresses/objects using text and SQL statements
  ("Show Data" button - search options : Town, District/County, Postcode, Street, ID or description)

5.2 Kernel Test Program

Administration and visualisation of geographical data by means of interactive maps. These data are organised according to *layers* and can be displayed on the user interface using this module.

The Kernel module provides three basic types of layers for visualising addresses, roads and backgrounds (forests, stretches of water, built-up areas, ...). Other modules, e.g. address monitor or map editor, use Kernel in order to display module data in the form of the module's own layers.



Kernel test program

5.2.1 Kernel Functions

- Map display
- Display several maps or multiple map views
- Implementation of standard architecture
  (MapControl in first sheet)
- Implementation of extended architecture
  (sheet with two map windows for every loaded map)
- Connection of Access or SQL server databases
- Import of existing address layers
- Display, define, manage, move, edit and delete standard objects such as polygons, circles, rectangles, arrows, lines, triangles, diamonds, pentagons, hexagons, stars, points, texts, bitmaps, colours and lines
- Automatic centring in the map window on the address searched for
- Directly position the map window on a particular map section
  (selecting a map section)
- Set object visibility independently of zoom level
- Create and access map editor layers
- Export the map as bitmap or Metafile
  (in KeTest: Tests ->Printing Test -> Bitmap Drawing to place the bitmap or Metafile in the clipboard)
- Set or change map folders
- Scrolling and moving
- Various coordinate formats:
  Mercator, Pixel, Geodecimal, GeoMinSec, UTM, GK, Logical
- Zooming
- Set "selectable" or "exclusively selectable" attribute for layers
- Selecting objects
- Display Quickinfo for objects

5.3 map editor Test Program

The Add-on module "map editor" enables the visualisation and administration of freely definable, geographical objects (circles, rectangles, polygons etc.).

map editor test program

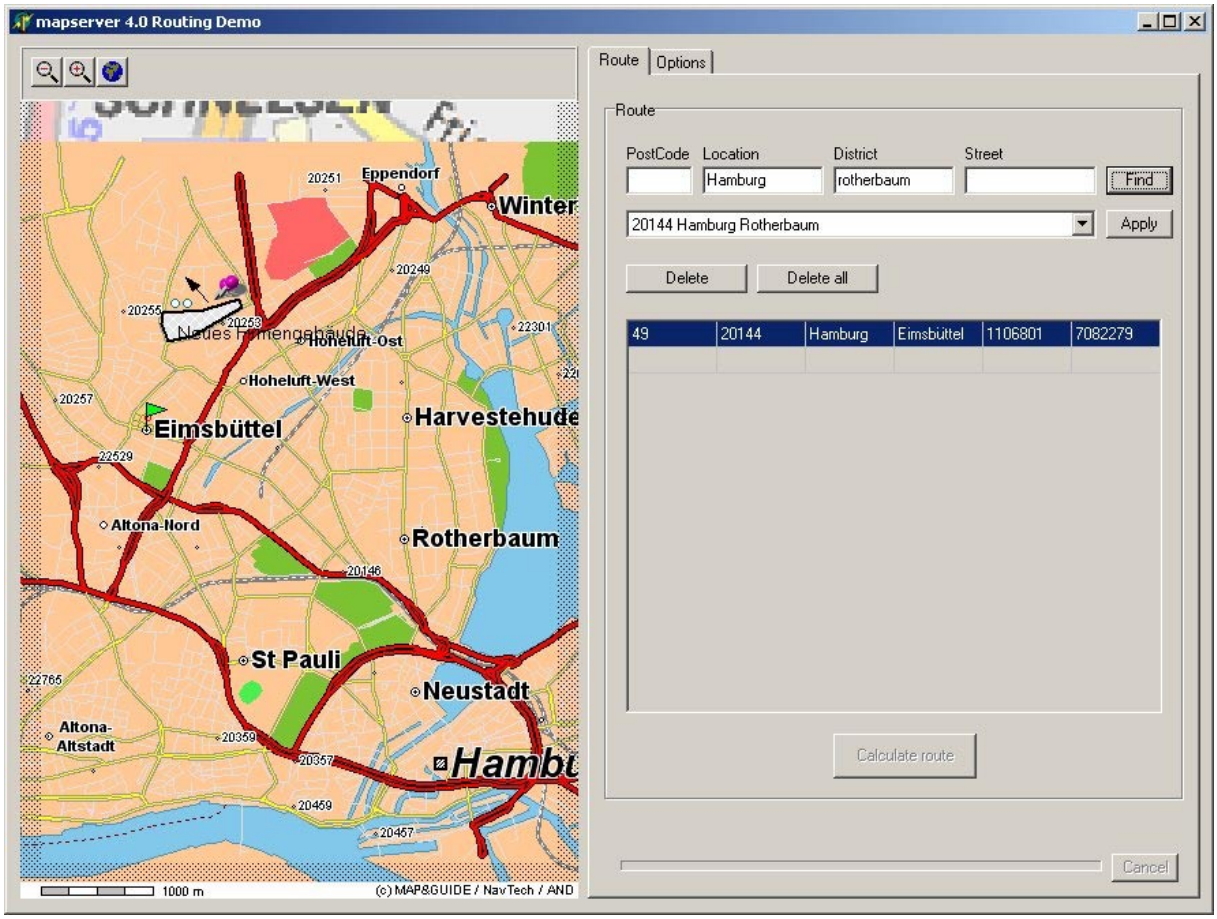
5.3.1 map editor Functions

- Graphical representation of address data
  (graphical filters)
- Communicate with individual layers
- Display, define, manage, move, edit and delete standard objects such as polygons, circles, rectangles, arrows, lines, triangles, diamonds, pentagons, hexagons, stars, points, texts, bitmaps, colours and lines.
- Show temporary objects (only stored in RAM) by disconnecting the database
  (in map editor demo - Tests - Use Temporary Object)
- Set object visibility independently of zoom level
- Create and access map editor layers

- Display Quickinfo for objects

5.4 Routing Test Program

The routing module offers functions for route calculation with generation of a detailed itinerary and an optional map.



routing test program

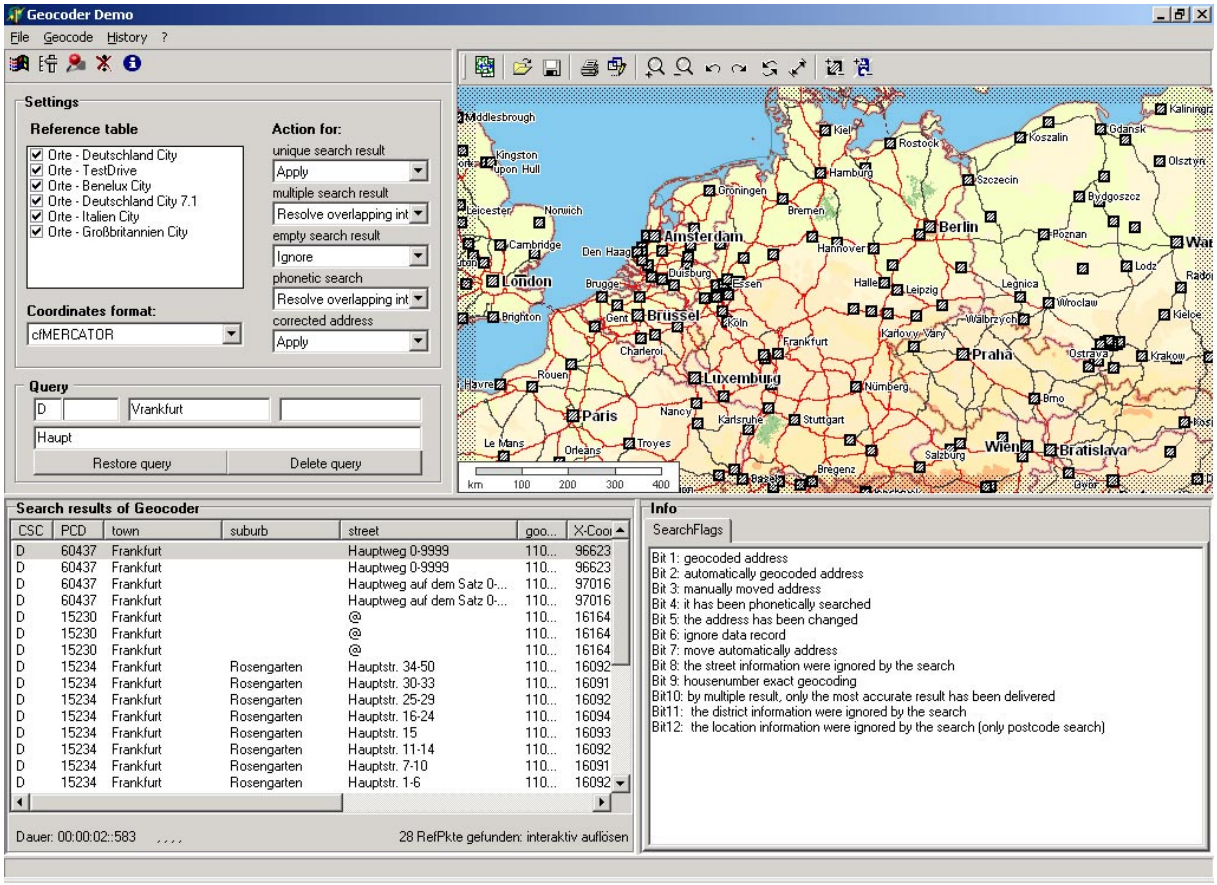
5.4.1 Routing Functions

- Specify departure and arrival times
- Calculate alternative routes (maximum of four)
- Distance calculation (shortest, quickest or most cost-efficient route)
  (TimeFaktor : 0 = shortest and 100 = quickest)
- Define vehicle-specific profiles, e.g. for speeds and restrictions
- Consider differences (in km) between stop-off points, breaks and stay times.

- Corridor search
- Account for toll roads throughout Europe
- Sequence optimisation
  (calculate optimal stop-off point sequence)
- Calculation of route with several stop-off points
- Delete routes
- Make routes visible or invisible
- Create itinerary with journey information: roads, duration
  (detailed list, start/end, important stop-off points)

5.5 Geocoder Test Program

Using the mapserver geocoder interface, the geographic information can be generated for a specified address. In addition the accuracy of the address can be checked and if necessary the address can be completed or corrected.



geocoder test program

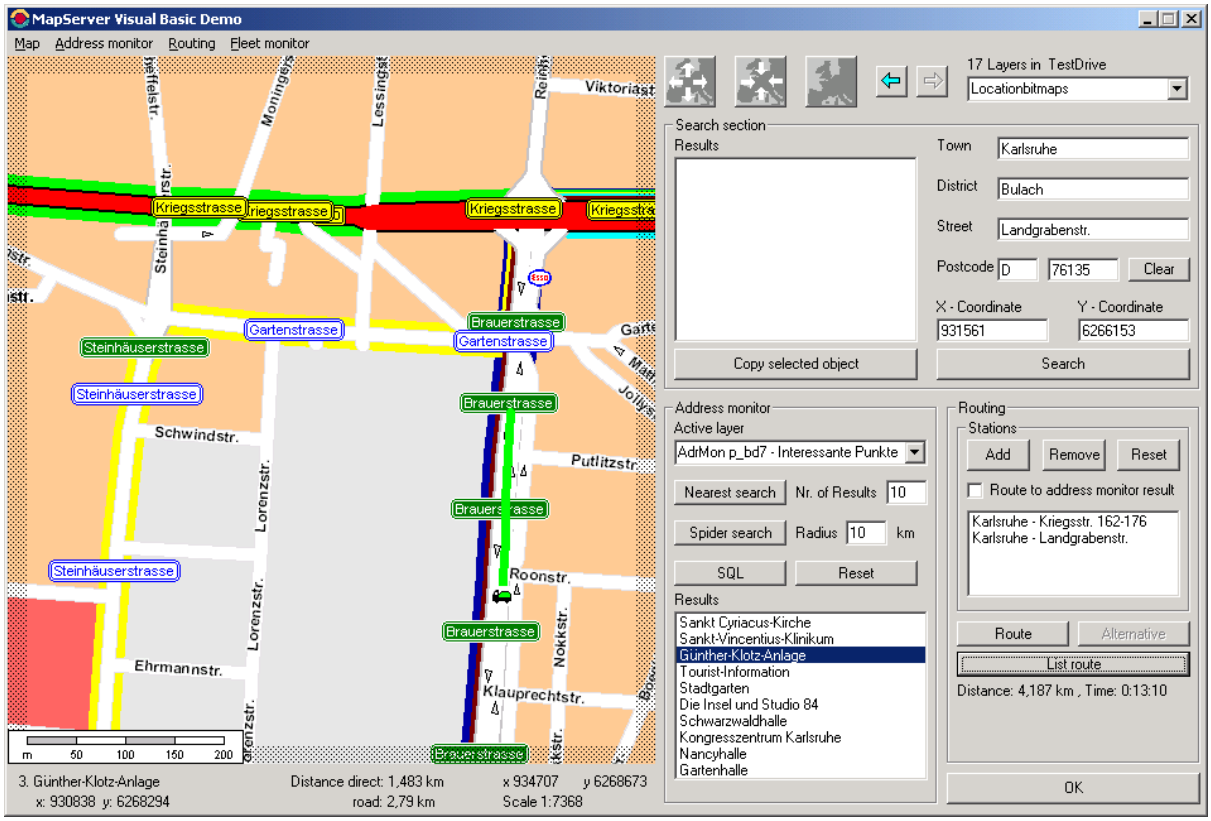
5.5.1 Geocoder Functions

- All available maps are automatically recognised and loaded (see combo box).
- Configurable search options (Apply, Resolve overlapping Interactor,Ignore)
- Graphical representation of address data (direct zooming on the map by double-clicking on the search result)
- Various coordinate formats can be chosen
- Address geocoding (phonetic, house number exact)

- Search for addresses/objects using text
  (Query search option: Country, Town, District/County, Street, House Number)
- Detailed description of geocoder search results
  with information on the search flag

5.6 Visual Basic Test Program

In Visual Basic, MapControl is the core component which is provided as the control element.



Visual Basic test program

5.6.1 address monitor Functions

Display and administration of customer-specific address data records - the properties of these records can be highlighted using geographical filters.

- Edit, correct addresses (in the table)
- Graphical representation of address data (graphical filters)
- Search for Next and spider search

5.6.2 Routing Functions

The routing module contains functions for route calculation and generation of a detailed itinerary.

- House number exact route planning in many European cities
- Specify departure and arrival times
- Calculate alternative routes (maximum of four)
- Distance calculation (shortest, quickest or most cost-efficient route)
- Define vehicle-specific profiles such as speed and restrictions
- Consider differences (in km) between stop-off points, breaks and stay times.
- Corridor Search
- Tolls/toll factors
  (only certain maps include these functions e.g. Germany Extra)
- Route optimisation with sequence optimisation
- Calculate route with several stop-off points (up to 100 points on route)
- Delete routes
- Make routes visible or invisible
- Create itinerary with journey information: roads, duration
  (detailed list, start/end, important stop-off points)
- Calculation of journey time
- Distance calculation in road kilometres

5.6.3 fleet monitoring

Module for managing and tracking a fleet of vehicles

- Sample implementation of visualising GPS data

5.6.4 geocoder Functions

Calculation of the geographical position using address data (postcode, town, street).

- Address geocoding (phonetic, house number exact)