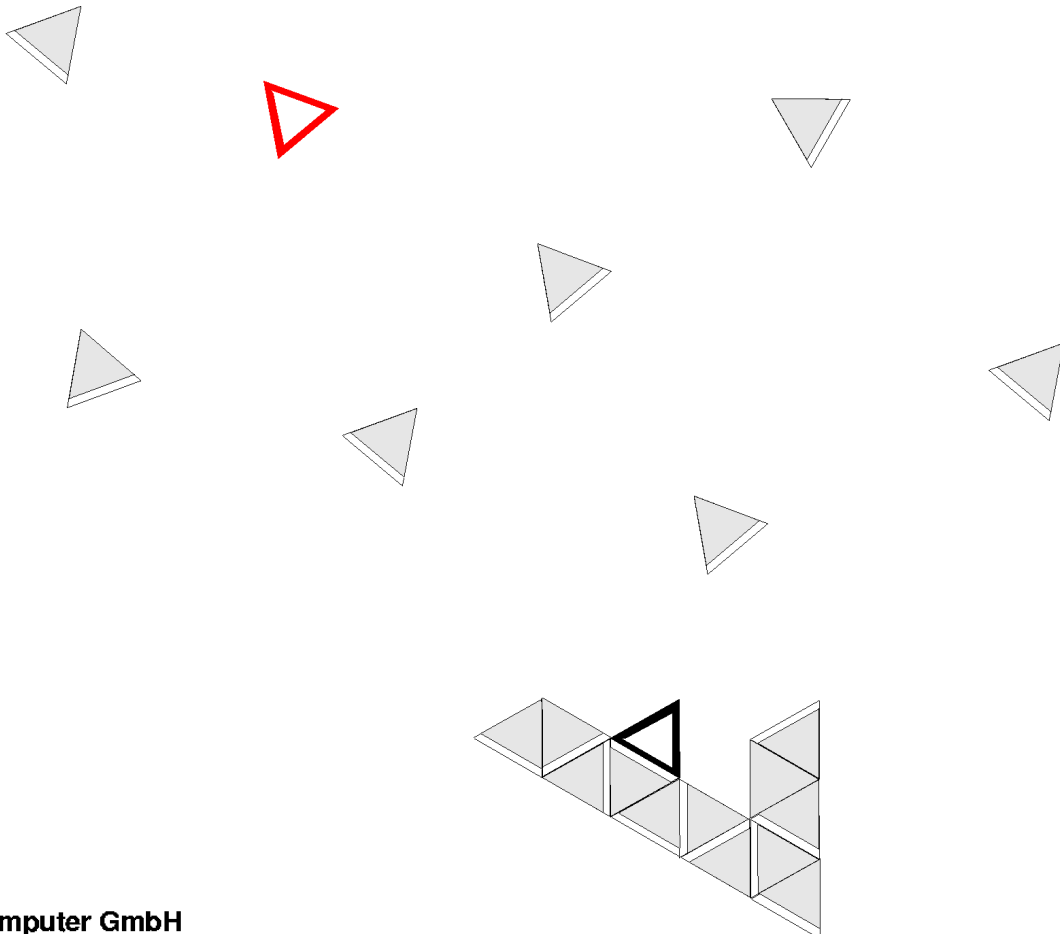


IF/Prolog

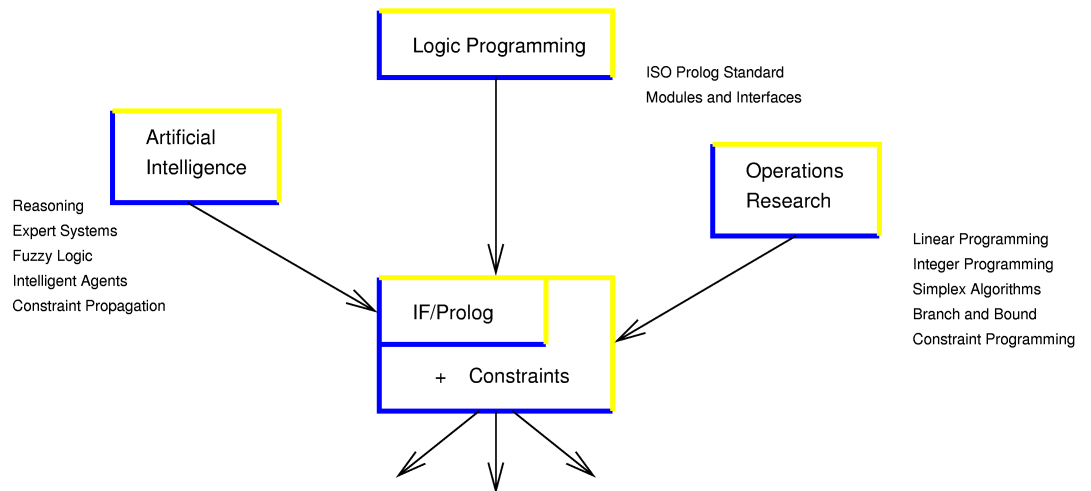


Application Development

– We Implement Your Competitive Edge –



Solid Theoretical Background in a continuously evolving area



Prolog has established its niche amongst other programming languages as the choice for special purpose use. IF/Prolog is one of the most well known and respected Prolog systems in use today.

It draws together the latest developments in the fields of Artificial Intelligence and Operations Research in a logic programming framework. With its interfaces to graphics, C/C++ and relational databases, IF/Prolog can be effectively embedded in a wide range of industrial applications, utilising existing information sources and routines.

At the kernel of the IF/Prolog system is the ISO standard programming language Prolog. The ISO standard ensures upwards compatibility and longevity of applications on all supported platforms. IF/Prolog is available for PCs, workstations, and supercomputers using UNIX and / or Windows.

You find IF/Prolog in everyday use in many real-world situations; in expert systems, constraint problems, internet information systems and more traditional software applications.

Industry is using IF/Prolog for its advanced problem solving capabilities as well as simply for its programmer convenience and productivity as a general purpose language.

Reasoning Applications

An expert system is a system which performs tasks specified by a set of rules, using search strategies to infer validity of a given goal.

IF/Prolog allows rules to be specified in a user-readable form by defining a grammar or by using a graphical front end; rule writers need therefore, not be programmers. Inference mechanisms can be built up to suit the type of problem to be solved.

IF/Prolog is much more than an expert system shell, it provides “declarative” programming, which allows any hard-to-represent problem to be modelled using notions of the conceptual level rather than at the procedural level.

Such applications can also be thought of as client-server solutions providing information from intelligent servers to their clients.

Intranet Applications

New for IF/Prolog 5.1, direct support for internet sockets and high level I/O streams enables Prolog to be embedded into intranet applications. Prolog is ideally suited to provide intelligent servers and help-desks across the internet.

In conjunction with Minerva (IF Computer’s Java based Prolog system) complete software architectures which span the internet can be developed. Information sources may be distributed and rules can execute either locally on the client machine or remotely on the intelligent server.

Local rules can be used to check information and combine the results from the queries placed to one or more internet servers.

Constraint Applications

Operations Research has traditionally provided solutions for allocation, scheduling or placement. The traditional approach to such problems, has been to rewrite existing solvers or use solver libraries and tailor the solver itself, to meet the specific problem. In either case, the development costs are considerable.

IF/Prolog has efficient builtin solvers which are applied to general purpose datatypes. It is simply enough, to represent a problem as Prolog datatypes, constraints and control.

Different solvers and constraint routines can be combined incrementally with heuristic steps, implemented as Prolog rules. This combination of optimisation and search leads more productively, to a specific problem solution.

Using IF/Prolog for constraint applications, retains all the benefits of a concise representation of the problem and accesses the power of general purpose solvers. /vfill

Productive Solutions

IF/Prolog is a high-productivity “declarative” software development environment. Prolog programmers typically concentrate on the description of their application, using notions of the conceptual level of the target domain.

The key advantages of using IF/Prolog in software engineering are the:

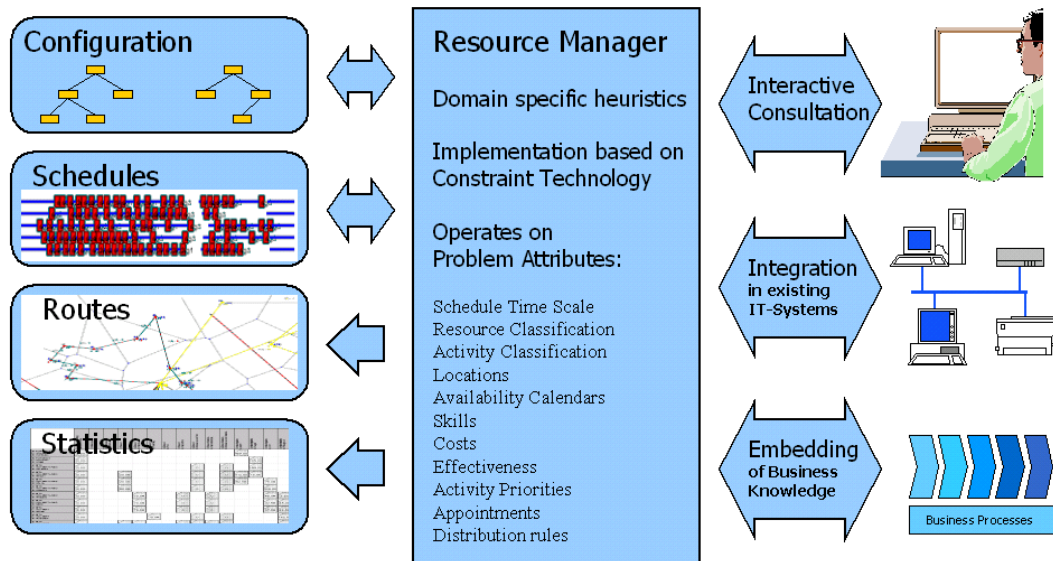
- high-level, maintainable representation of your problem.
- easily specified interpretation of textual information.
- incremental, modular development within a graphical environment.
- powerful interaction with database systems, graphics, other languages and the internet.
- builtin support for memory management, pattern matching, search, databases and powerful optimisation solvers.

Reduced Maintenance Costs
Reduced Development Costs
Reduced Development Time

For application development this has a number of consequences:

- Increased programmer productivity.
- Increased re-use of code from its concise modular nature.
- Increased efficiency of the develop, test, debug cycle.
- Decreased code-size, reduces the associated maintenance costs.
- Decreased porting costs due to full compatibility and wide availability.
- Decreased delivery time.

Case Studies in:
Technology, Finance and Fashion



Work Scheduler

Intelligent scheduling of utility workers (gas, electricity, water and telecommunications), service and maintenance personnel that visit customers as part of their daily routine, was a prerequisite of this project.

The US firm **Logica Inc.**, Houston (Texas), has developed for their product Asset and Resource Management (ARM) a new component **Work Scheduler Plus** that facilitates the efficient interactive scheduling of service personnel.

Resource Manager, IF Computer’s comprehensive tool for planning and scheduling all kind of resources on the basis of IF/Prolog with Constraint Technology, is integrated as a central part of the Work Scheduler Plus component.

Resource Manager supports the business processes of preliminarily scheduling customer-appointments and interactively scheduling all

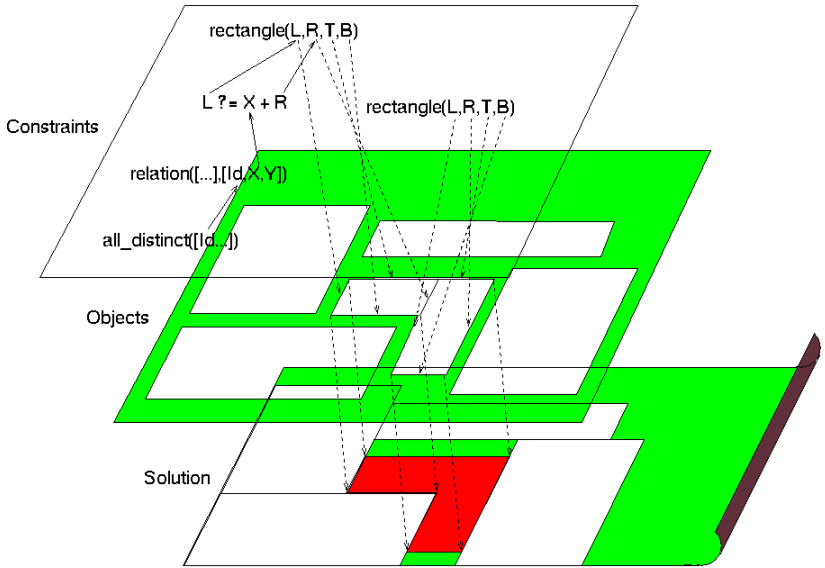
tasks for resources including customer appointments, service and construction work.

ARM Work Scheduler Plus supports the appointment planning ensuring that when possible other jobs are scheduled to occur near to existing appointments. The telephone operator can decide whether an appointment at a definite time can be guaranteed, when accounting for all the other tasks and appointments to be performed that day.

The schedules are planned interactively and automatically in a significantly less time than it would otherwise take. The system assists the operator in ensuring that scheduled tasks are consistent with all aspects of the requirements, availability, and cost and travel times.

ARM is in use by over fifty large utility companies worldwide.

**Case Studies in:
Technology, Finance and Fashion**



2D-Packing

A recent customer contract for IF Computer involved optimising material utilisation on a continuous roll of material, so that, when cut, minimal wastage remained.

The application was developed for use in the carpet industry where a tremendous variety of shapes is required for carpeting medium sized industrial premises such as hotels and public houses. This variety and the large number of shapes make such an optimisation very complex.

The approach taken was especially efficient through use of IF/Prolog’s constraint technology. Constraints are specified so that objects do not overlap for different object orientations and positions on the material.

The illustration shows the high-level mapping between variables, structures and builtin constraints and the actual problem they represent.

In general, a combination of heuristic steps, to perform sub-parts of the problem, in a sequential manner and optimisation steps, which utilise IF/Prolog’s builtin solvers, ensured that actual coding time was kept to a minimum.

Layers of constraints are built up before and at various points during the execution, breaking down the overall optimisation, into one which is manageable as a combination of search and optimisation steps.

Moreover, by adjusting the heuristics and optimisation parameters, a solution was found which suited the customer both in optimality and in speed of execution on the chosen hardware.

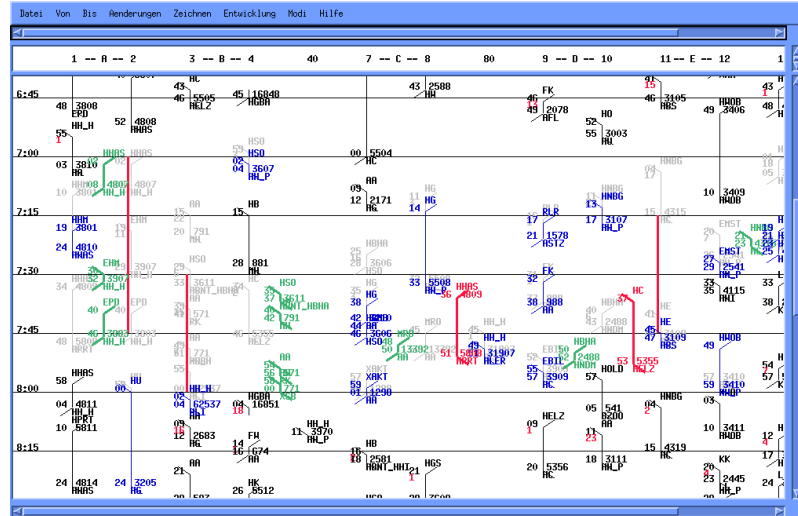
Hardware

MS-Windows PC

Software

F/Prolog Development System
Constraint Technology Package
Visual BASIC

Case Studies in: Technology, Finance and Fashion



Reactive Rail Timetabling

Siemens AG R&D has developed a prototype station scheduling system for the Deutsche Bundesbahn, which is capable of performing the day-to-day scheduling of a typical large station.

The computer system models all aspects of the station and aims to assist the station controllers with the whole task. It reacts to real-time scheduling problems which occur when trains are delayed or non-scheduled arrivals are added. Controllers can also interactively adjust the schedule to meet other station activities, for example, track and platform maintenance.

The system re-schedules the arrivals, minimising the overall disruption to the pre-planned timetable, considering old and new priorities. The illustration shows a portion of the re-scheduled timetable for the station.

Constraints are specified that must be met in determining a new schedule, the system then searches for a good solution.

These time and allocation constraints restrict the timetable. The scheduler must compensate by reducing the time trains remain at platforms, by delaying other trains or in the worst case, by allocating train and passengers to other platforms. Reducing passenger movements is a key issue in the efficient running of a station.

Clearly, for such a problem there is not one optimal solution for a given set of delays; therefore the system is also able to react on more subjective optimisation criteria.

Execution takes less than 20 seconds on a small UNIX workstation and is sufficient to meet the needs of the real-time pressures of a large, busy railway station.

In total, the application represents 2 man years development and demonstrates that Constraint Technology with IF/Prolog can be used to effectively express such problems in a convenient, readable form.

Case Studies in: Technology, Finance and Fashion

Pension Funds

PFA Systems Limited is Bacon & Woodrow's software house, one of the leading firms of actuaries and consultants in Europe. They are dedicated to providing IT solutions for pensions administration departments of large organisations, and in particular pensions administration software.

The PFA System is designed on the principle that every pension scheme is different, with individual complex requirements and priorities. The system uses a modular design that enables PFA Systems to methodically translate pension scheme rules and requirements in to the administration software.

Central to this is a Knowledge Based Calculations System that allows administrators to calculate the benefits payable to each member. This simple to use calculations tool ensures that scheme rules and factors can be easily understood and presented graphically.

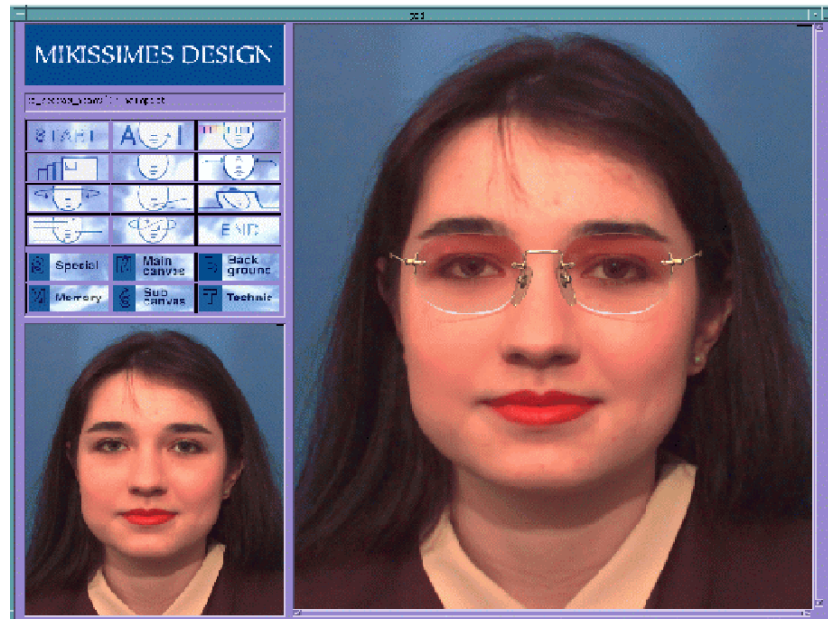
With other computer languages it would be necessary to completely rewrite parts of the system for each of the frequent changes in company rules and government legislation. This would significantly increase the cost of maintenance and development.

The PFA System uses IF/Prolog within the Knowledge Based Calculations System to allow the rules to be expressed in a form easily understood by actuaries and administrators.

This language is a "declarative" description of the pension scheme calculation rules, which are then executed directly by the system. The major benefit is that pensions experts themselves can specify the appropriate rules and calculations.

PFA Systems Limited provides solutions to many of the most complex pension administration departments within the UK. The PFA System is the leading product of its class.

Case Studies in: Technology, Finance and Fashion



Spectacle Design

1994 the optical retail chain Paris Miki, opened its stylish boutique “Mikissimes” in the prestigious shopping mall Carrousel du Louvre, which is part of the Grand Louvre concept realised on the occasion of the 200th anniversary of the Louvre Museum in Paris.

The boutique specialises in order made spectacles, custom designed with a workstation based computer vision system. The artificial intelligence component of the system, implemented by InterFace Computer Japan using IF/Prolog, uses video image data, optical knowledge and designer know-how to propose shape and colour for fashionable and functional spectacles, that match the wearer’s personality and style.

The concept of interactively designing order made spectacles, together with the customer, on a computer, is a world first.

The customer’s face is visualised with the spectacles on the computer screen, correcting the projected image according to the distortion the lenses cause.

The customer expresses preferences for colour, tint, style and material. Lenses of the correct dioptré are then machined, in-house, via communication with a local-area network, to the designed shape and the bridge and ear pieces, are attached.

The finished optical design system is now installed in more than 500 MIKI shops in Japan and in several key locations in Europe.

Hardware

NEC EWS 4800 UNIX Workstation

Software

IF/Prolog Development System
OSF/Motif Interface

Other Reference Projects:

AT&T - Lucent Technologies

An event correlation system, within the Total Network Management product, which assists in the prompt repair of telecom. networks.

Deutsche Telecom

An expert system to advise service in telephone stores, translating the customers requirements, into the most viable configuration.

EDV Compas

German federal governments use a computer-based monitoring system for special wastes, to promote their optimal handling and recycling.

Hewlett Packard

OCEX, an expert system for clearing hardware / software orders, is in use by nine major divisions of HP worldwide.

Korea Electric Power Corp.

An expert system for load transfer analysis in power distribution.

Nokia Mobile Phones

A system for automatic configuration of mobile telephone software, which also performs compilation and generation of mobile phone software.

Nordic Offshore

An expert system for monitoring the drilling process on offshore platforms. The system spots non-optimal drillings, and proposes counter-measures.

Promatis Informatik

INCOME – A commercial product for optimizing and simulating the business process, in conjunction with Oracle RDBMS.

Siemens AG

A Circuit Verification Environment for the rapid development of VLSI technology which checks the logical correctness of integrated circuits.

Siemens Nixdorf Informationssysteme AG

TransView is a management system for using products/solutions in complex networks.

Toda Construction Co. Ltd

A real time expert system for excavation control of the pressurised slurry shield tunnelling.

Zentrum für Experten Systeme Dortmund

Several expert systems for use in the chemical industry.

Company Profile

IF Computer is located in Germany and operates successfully in the world markets of knowledge engineering and complex optimisation. We utilise existing and newly emerging technologies to deliver client-server and intranet based solutions.

IF Computer provides quality project development, support, training and software consultancy; covering more native languages, continents and cultural backgrounds than any other specialist knowledge engineering company.

Synergy through sales of products, support and project work enables us to provide the maximum benefit of this technology to all of our customers.

System Requirements

IF/Prolog is available on all major UNIX and Windows platforms. Please note: additional software components will be required in conjunction with the interfaces.

	Memory	Disk Space
IF/Prolog Development System	8 Mb	10 Mb
Constraint Technology Package	16 Mb	6 Mb
SQL Interface	8 Mb	2 Mb
OSF/Motif Interface	16 Mb	10 Mb

Customer Support

IF Computer supports its clients in all phases of a software project. In this paper, different projects have been presented as examples of successful implementation and cooperation with our clients.

We offer turn key solutions as well as partnerships in mixed project teams, to provide efficient know how transfer and if required long term support or further development work.

IF/Prolog customers receive comprehensive support through our Software Service contracts.

IF Computer also offers a complete training program to all aspects of IF/Prolog.

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