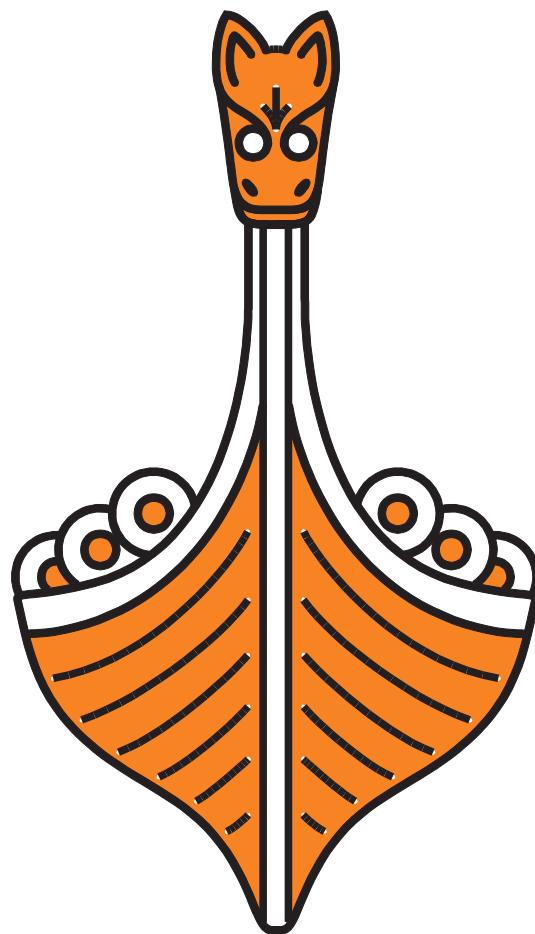# DYALOG

Deerfield Beach 2013

Conference Programme

Sunday 20th October – Thursday 24th October 2013

Welcome to the
Dyalog User Conference 2013
at Deerfield Beach, Florida

All of the presentation and workshop materials are available on the Dyalog 2013 Conference Attendee website at http:/conference.dyalog.com/. Details of the username and password for this site can be found in your conference registration pack. This website is available throughout the conference and will remain available for a short time afterwards – it will be updated as and when necessary.

We will be recording the presentations with the intention of uploading the videos to the Internet. For this reason, please do not ask questions during the sessions until you have been passed the microphone.

It would help the presenters if you can wait until the Q&A session that concludes each presentation to ask your questions. If your question can't wait, or if the presenter specifically states that questions are welcome throughout, then please raise your hand to indicate that you need the microphone.

All of Dyalog's presenters are happy to answer specific questions relating to their topics at any time after their presentation.

Scavenger Hunt
Have fun and get to know the other delegates by participating in the scavenger hunt that is running throughout Dyalog '13. The hunt runs until 18:30 on Wednesday and prizes will be awarded at the Banquet. Team assignments, rules and the scavenger hunt list will be handed out at registration. Guests are welcome to join in as well as conference delegates. Good luck and happy hunting!

For practical information, see the back cover
If you have any questions not related to APL, please ask Karen.

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Introducing Dyalog Ltd. Staff at Dyalog '13

This year, Dyalog Ltd. is represented by 19 members of the current team. Geoff, Helene and Vince can't be with us but here's a brief introduction to the rest of us. Welcome to Dyalog '13!

Gitte (gc@dyalog.com)
Managing Director (CEO)

Expertise: Software Development, all things business-related

Morten (mkrom@dyalog.com)
Technical Director (CTO)

Expertise: APL

Useful Dyalog e-mail addresses:

- conference@dyalog.com
  any conference-related issues, both technical and non-technical

- sales@dyalog.com
  any non-technical questions related to Dyalog APL, for example, pricing information, licence purchase (not conference-specific)

- support@dyalog.com
  any technical questions concerning Dyalog APL (not conference-specific)

The Dyalog forums (http://forums.dyalog.com/) are regularly visited by Dyalog staff as well as other stalwarts of the Dyalog community and are a great place to ask questions and share your expertise.

Andy (andys@dyalog.com)

Expertise: APL on UNIX, APL Support, DSS, Web presence (tech. aspects)

Dan (danb@dyalog.com)

Expertise: APL language, SALT, User Commands, Application Programming

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Bjørn (bhc@dyalog.com)

Expertise: SQAPL, Conga, Security

Fiona (fiona@dyalog.com)

Expertise: Documentation

Brian (brian@dyalog.com)

Expertise: APL Programming, App Design, Web Apps, MiServer

Jason (jason@dyalog.com)

Expertise: Windows/Linux servers and networks, PHP code

Jay (jay@dyalog.com)

Expertise: APL language, Application Performance, Compilers

John (johnd@dyalog.com)

Expertise: RIDE, GUI, .NET, OLE, IDE, APL Language Design

John (john@dyalog.com)

Expertise: APL language, dfns

Jonathan (jonathan@dyalog.com)

Expertise: APL on Windows, .NET, RIDE

Karen (karen@dyalog.com)

Expertise: Sales Support, Office and Account Management, Cat herding!

Liam (liam@dyalog.com)

Expertise: APL interpreter, RIDE, Visual Studio integration

Nic (nicolas@dyalog.com)

Expertise: SharpPlot

Roger (roger@dyalog.com)

Expertise: APL language and implementation

Pat (pat@dyalog.com)

Expertise: U.S. marketing/sales

Vibeke (vu@dyalog.com)

Expertise: Publicity, Branding

Richard (richard@dyalog.com)

Expertise: Component/Native Files, Regular Expressions, APL Interpreter

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User Conference 2013

Sunday 20th October: Timetable of Events

08:30 – 09:30	Registration
09:30 – 13:00 10:45 break for **tea/coffee**	**Workshops and Tutorials*** **(SA1) Starting a New Application in Dyalog APL** *Dominique Room* Morten Kromberg, Technical Director (CTO) **(SA2) Secure Applications** *Kingston Room* Brian Becker, APL Tools Group Manager Bjørn Christensen **(SA3) OO and CC** *Guadeloupe Room* Dan Baronet **(SA4) APL on the Raspberry Pi (and other UNIX platforms)** *St. Anne Room* Andy Shiers, Operations Manager (COO) Jason Rivers
13:00 – 14:00	**LUNCH** *BT's Oceanfront Restaurant*
14:00 – 17:30 15:45 break for **tea/coffee**	**Workshops and Tutorials*** **(SP1) Introduction to WPF** *Guadeloupe Room* John Daintree, Chief Architect Michael Hughes (MJH Software Services Ltd.) **(SP2) Introduction to MiServer** *Dominique Room* Brian Becker, APL Tools Group Manager

	(SP3) User Commands *Kingston Room* Dan Baronet **(SP4) Robot Workshop** *St. Anne Room* Andy Shiers, Operations Manager (COO) Jason Rivers Liam Flanagan
17:30 – 19:00	Free time (including complimentary evening reception in the hotel bar next to BT's Oceanfront Restaurant from 17:30)
19:00 – 20:30	**DINNER** *Spa Patio*
20:30 – 22:00	**(D00) Robot Wars** *Main Auditorium* Morten Kromberg, Technical Director (CTO) This session also includes the finals and prize ceremony for the "robot race" that is part of the Robot Workshop (SP4).

* see page *18* for an overview of the suggested training course tracks

For workshop and tutorial abstracts, see pages *19-25*.

NOTES:

Monday 21st October: Timetable of Events

All presentations take place in the *Main Auditorium*.

08:30 – 09:30	Registration
09:30 – 10:00	**(D01) Welcome to Dyalog '13** Gitte Christensen, Managing Director (CEO) (includes an introduction to the members of Team Dyalog)
10:00 – 10:45	**(D02) Technical Keynote** Morten Kromberg, Technical Director (CTO)
10:45 – 11:15	**TEA/COFFEE**
11:15 – 12:00	**(D03) The Remote IDE Version 1.0** John Daintree, Chief Architect Andy Shiers, Operations Manager (COO)
12:00 – 13:00	**LUNCH** *BT's Oceanfront Restaurant*
13:00 – 14:00	**(D04) Windows Presentation Foundation:** **Part I – WPF and Data Binding** John Daintree, Chief Architect
14:00 – 14:45	**(I01) The Syncfusion Libraries** Chad Church (Syncfusion)
14:45 – 15:15	**TEA/COFFEE**
15:15 – 15:45	**(D04) Windows Presentation Foundation:** **Part II – Simplifying WPF** Michael Hughes (MJH Software Services Ltd.)
15:45 – 16:30	**(D05) Towards Industrial Strength Web Applications** Brian Becker, APL Tools Group Manager
16:30 – 16:45	Short break
16:45 – 17:30	**(D06) Version 14.0 File System Enhancements** Richard Smith, Development Manager

17:30 – 19:00	Free time (including complimentary evening reception in the hotel bar from 17:30)
19:00 – 20:00	**DINNER** *JB's on the Beach* (meet at 18:30 on the Oceanfront patio to walk down together or join us there)

For Dyalog presentation abstracts see pages *26-31*.
For invited speaker and user presentation abstracts see pages *32-36*.

NOTES:

Tuesday 22nd October: Timetable of Events

All presentations take place in the *Main Auditorium*.

08:30 – 09:00	**(D07) Parallel Language Features in Version 14.0** Morten Kromberg, Technical Director (CTO) Jay Foad
09:00 – 09:30	**(D08) Rank and Friends** Roger Hui
09:30 – 10:00	**(D09) Train Spotting in Version 14.0** John Scholes
10:00 – 10:30	**TEA/COFFEE**
10:30 – 11:15	**(D10) Reducing Interpreter Overhead** Jay Foad
11:15 – 12:00	**(I02) Optimising APL Expressions** Eugene Ying (Fiserv)
12:00 – 13:00	**LUNCH** *BT's Oceanfront Restaurant*
13:00 – 13:45	**(U03) Cosmos Performance Improvements** Paul Grosvenor (Optima Systems)
13:45 – 14:30	**(I04) Co-Dfns Compiler** Aaron Hsu (University of Indiana)
14:30 – 15:00	**TEA/COFFEE**
15:00 – 15:45	**(U05) To Unicode Or Not To Unicode** Alexei Miroshnikov (Infostroy Ltd.)
15:45 – 16:30	**(D11) Primitive Performance** Morten Kromberg, Technical Director (CTO) Roger Hui
16:30 – 16:45	Short break

16:45 – 17:30	**(D12) Dyalog File Server Version 2.0** Morten Kromberg, Technical Director (CTO)
17:30 – 19:00	Free time (including complimentary evening reception in the hotel bar from 17:30)
19:00 – 20:30	**DINNER** *Spa Patio*
20:30 –	**(D13) Social Skills for Programmers** John Scholes

For Dyalog presentation abstracts see pages *26-31*.
For invited speaker and user presentation abstracts see pages *32-36*.

NOTES:

Wednesday 23rd October: Timetable of Events

All presentations take place in the *Main Auditorium*.

08:30 –09:00	**(D14) Interfaces to R, Q and NAG** Morten Kromberg, Technical Director (CTO)
09:00 – 09:30	**(D15) User Command Update** Dan Baronet
09:30 – 10:00	**(D16) Documenting Dyalog APL** Fiona Smith, Documentation Manager
10:00 – 10:30	**TEA/COFFEE**
10:30 – 11:15	**(U06) Applying Version 13.2 GUI Features to SOFIA** Valentina Settimi (APL Italiana)
11:15 – 12:00	**(I07) Test Driven Development (TDD) in APL** Gianfranco Alongi (Ericsson AB)
12:00 – 13:00	**LUNCH** *BT's Oceanfront Restaurant*
13:00 – 13:45	**(I08) Computer Science Outreach and Education with APL** Aaron Hsu (University of Indiana)
13:45 – 14:00	**Prize Ceremony, Worldwide APL Contest 2013**
14:00 – 14:45	**(U09) How I Won the Dyalog Programming Contest** Yanqing Chen (State University of New York)
14:45 – 15:15	**TEA/COFFEE**
15:30 – 17:30	**Viking Challenge** *On the beach!* (meet at 15:20 on the Oceanfront patio to walk down together or join us there)
17:30 – 18:30	Time to dress up

18:30 - 19:30	Pre-dinner drinks reception *Spa Patio*
19:30	**BANQUET DINNER** *Ballroom (aka Main Auditorium)*

For Dyalog presentation abstracts see pages *26-31*.

For invited speaker and user presentation abstracts see pages *32-36*.

NOTES:

Thursday 24th October: Timetable of Events

All presentations take place in the *Main Auditorium*.

08:30 – 09:15	**(U10) The Three Blind Pis** The Mice Who Were Once Called Blind a.k.a. James Greeley, Sam Gutsell & Shaquil Sidiki (Optima Systems)
09:15 – 10:00	**(D17) The Future of SharpPlot and RainPro** Nicolas Delcros
10:00 – 10:30	**TEA/COFFEE**
10:30 – 11:15	**(U11) Cash Flow for Business and Personal Use** Illse Nell (RiskFlow)
11:15 – 12:15	**(I12) The Stormwind Simulator** Tomas Gustafsson (Stormwind.fi)
12:15 – 12:30	Short break
12:30 – 13:00	**Open Forum & Closing Session** Team Dyalog
13:00 – 14:00	**LUNCH** *BT's Oceanfront Restaurant*
14:00 – 17:00 15:30 break for **tea/coffee**	**Workshops and Tutorials*** **(TP1) WPF Masterclass** *Kingston Room* Michael Hughes (MJH Software Services Ltd.) **(TP2) MiServer Masterclass** *Dominique Room* Brian Becker, APL Tools Group Manager **(TP3) Introduction to SharpPlot** *St. Anne Room* Nicolas Delcros

	(TP4) Test Driven Development *Guadeloupe Room* Gianfranco Alongi (Ericsson AB)

* see page *18* for an overview of the suggested training course tracks

For workshop and tutorial abstracts, see pages *19-25*.
For Dyalog presentation abstracts see pages *26-31*.
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NOTES:

Workshops and Tutorials – Suggested Tracks

Each of the training courses can be attended independently, but we have constructed a few "tracks".

The first session on Sunday, SA1: Starting a New Application in Dyalog APL, is intended to lead into one of the introductory sessions SP1 and SP2, depending on whether your main focus is on Windows Desktop or Portable/Web applications. For those who want to go in depth with one of the front-end technologies, TP1 and TP2 provide Masterclass sessions on WPF and MiServer respectively.

The two sessions SA4 and SP4 on Sunday are constructed around Dyalog APL for the Raspberry Pi and using it to control robots, culminating in a robot programming competition (robots will be provided) with a prize ceremony on Sunday evening. However, despite the fun element provided by robots, the sessions are designed to be useful to anyone using Dyalog APL under Linux or UNIX, and will also feature the new RIDE for these platforms.

There are two sessions on development tools – SA3 on Code Coverage utilities and a worked example of Object Oriented programming and SP3 on User Commands. Two sessions are dedicated to application tools; SA2 on writing secure applications using the Dyalog Encryption Library and TP3 on the SharpPlot graphics library that is included with Dyalog APL. Finally, TP4 explains Test Driven Development and shows how to apply this to APL using APLUnit (a TDD library for APL).

The workshop attendance pre-requisites are listed by workshop at http://www.dyalog.com/dyalog_13/pre_reqs.php. Please ensure that you meet these pre-requisites before attending a workshop if at all possible.

Unless a session is explicitly marked as a Workshop it will be a Tutorial, where code will be presented (and possibly handed out) but without significant time set aside for experimentation.

Workshops and Tutorials – Abstracts

(SA1) Starting a New Application in Dyalog APL (Sunday 09:00-12:30)
Morten Kromberg, Technical Director (CTO)

When you start a new application, or make significant revisions to an existing one, there are a number of decisions to be made. The evolution of Dyalog APL, the platforms on which APL runs, an increased focus on server applications and the availability of source code management tools that can handle APL code mean that application architectures need to adapt. This workshop is based around a discussion of the architectures of a number of applications built recently by the APL Tools Group at Dyalog, including MiServer, the StandAlone Web Service framework (SAWS) and the Dyalog File Server (DFS). Topics will include:

- the structure and organisation of source code, including utility libraries
- application configuration and access to external data
- error and usage logging
- running as a *service*: process management and load balancing
- the choice of user interface technologies for desktop, mobile and web applications

This workshop is designed to lead into either SP1 (Introduction to WPF) for users wishing to focus on Microsoft Windows desktop applications or SP2 (Introduction to MiServer) for users more interested in Web or Cross-platform apps – and will feature "teaser" introductions to both user interface technologies.

(SA2) Secure Applications (Sunday 09:00-12:30)
Brian Becker, APL Tools Group Manager & Bjørn Christensen

Let's face it…

- Hardly a day goes by without the media reporting the theft of, or unauthorised access to, sensitive data.
- Security is a pain in the neck – it's complicated, cumbersome and there's always someone out there looking to circumvent it.
- Security isn't exciting – unless it fails, and then it's exciting in an altogether unpleasant manner.
- The days when you could put your applications and data behind a locked door with limited access over a private network are, by and large, over.

Nevertheless, security must be a core discipline in your operation if you have data, whether yours or your clients', that needs to be protected.

In this tutorial, we will examine common situations in APL application development where security measures might need to be applied. We will then work through a number of examples in the use of digital certificates, encrypting and decrypting data, authentication, digital signing, and secure communications using Conga (Dyalog's TCP/IP communications framework) and the Dyalog Cryptographic Library.

(SA3) OO and CC (Sunday 09:00-12:30)
Dan Baronet

This introduces two sets of tools that should be in the belt of anyone who wants to build real applications in Dyalog APL. This session consists of two separate 90-minute sessions:

Part 1: Object Oriented Programming

This workshop is about putting together an application made mostly of OO objects. In it you will learn to create objects and combine them to build a simple game. You will learn about and use classes, base classes, properties, overloaded constructors and other object-oriented features, as well as how to encapsulate the resulting application. The final product will be a fully-fledged Windows (GUI) game!

Part 2: Code Coverage

Code Coverage (CC) is the art of discovering how thoroughly your tests exercise your codebase to verify that all of your code does what it's expected to. In this workshop you will learn to identify unused code (line coverage) and branches of control structures that are never taken (decision coverage). The pitfalls of certain types of expressions will be discussed. The goal is to put you in a better position to write complete test suites for your code and eliminate dead code.

(SA4) APL on the Raspberry Pi (and other UNIX platforms) (Sunday 09:00-12:30)
Andy Shiers, Operations Manager (COO) & Jason Rivers

APL for the Raspberry Pi is the most recent addition to the Dyalog APL family and is an exciting target for educational projects, electronic gadgets and other low-cost computing applications. Linux is growing in popularity as an efficient and cost-effective platform, especially for server applications. This workshop leads you through installing and configuring Dyalog APL on a Raspberry Pi, explaining how to use the new RIDE as well as the original character-mode user interface and how to use a number of common methods of remotely accessing the Dyalog APL session from Linux and Windows. It also includes an example of using shared libraries and demonstrates a new delivery mechanism for Dyalog APL using Linux repositories.

Although the end goal of this workshop is to send a command from APL on a Raspberry Pi to an Arduino front end processor used to control a robot, it also covers subjects that apply to creating any application using Dyalog APL on any flavour of UNIX.

(SP1) Introduction to WPF (Sunday 13:30-17:00)
John Daintree, Chief Architect & Michael Hughes (MJH Software Services Ltd.)

Windows Presentation Foundation is the current state-of-the-art technology for rendering desktop user interfaces under Microsoft Windows. Dyalog recommends WPF as an alternative to the Win32-based GUI tools that are built-in to Dyalog APL. Version 14.0 will provide enhanced support for WPF, including mechanisms for data binding.

This tutorial will first demonstrate how WPF applications can be driven entirely by Dyalog APL and follow up with an introduction to the development of WPF-based applications using external GUI design tools like Microsoft Expression Blend and Visual Studio (including the free Express version of VS).

(SP2) Introduction to MiServer (Sunday 13:30-17:00)
Brian Becker, APL Tools Group Manager

Do you have a legacy APL application that needs a facelift?

Do you have an application that you'd like to deliver over the Internet, perhaps to mobile devices?

Do HTML, CSS or JavaScript intimidate you?

If you answered "yes" to any of these, or if you simply have an interest in learning about APL and the Internet, then please join us in this tutorial.

MiServer, Dyalog's APL-based web server, enables you to combine the power of APL with the ease of delivery achievable via the web. Even if you've used MiServer before, check out this tutorial as it introduces MiServer 3.0 which features, among other things, an object-oriented framework for building web content, mobile platform support and a host of new jQuery widget interfaces. MiServer runs on any platform supported by Dyalog APL; Microsoft Windows, Linux and even the Raspberry Pi.

More than just a web server, MiServer includes a comprehensive and extendable framework for the development of web content in APL. By the end of this tutorial, you'll have installed MiServer (bring your laptop!) and, at a minimum, written your first web page (we call it a MiPage) as well as have an understanding of the major features of MiServer.

(SP3) User Commands (Sunday 13:30-17:00)
Dan Baronet

User Commands are tools and utilities that are written in APL; they are part of the development environment and are available in any workspace. Dyalog APL ships with many User Commands out-of-the-box but, as the name suggests, you can also create your own.

In this workshop you'll learn about existing User Commands and create new ones of your own. In the process you will learn how to use the Dyalog command parser, how to add command options and how to use the existing utilities to locate items in the workspace and in files using regular expressions. As a result you will be able to create a more productive development environment.

(SP4) Robot Workshop (Sunday 13:30-17:00)
Andy Shiers, Operations Manager (COO), Jason Rivers & Liam Flanagan

This workshop concentrates on understanding how the "DyaBot" is constructed and how to use Dyalog APL (running on a Raspberry Pi embedded in the robot) to implement an autonomous navigation system. Following an introduction, two hours of the workshop will be run as a competition between teams working together to write APL code to enable robots to move round a course, making use of the sensors on the robot to avoid obstacles. Robots will be provided, so you won't need to bring a soldering iron!

Although this workshop is aimed at those who have an interest in driving a robot, it should also be of interest to anyone who wants to get experience of writing and debugging code under UNIX versions of Dyalog APL using RIDE.

(TP1) WPF Masterclass (Thursday 13:30-17:00)
Michael Hughes (MJH Software Services Ltd.)

Following on from the introduction on Sunday, this masterclass goes into the details of a complete WPF-based application that was written for a customer. The application will be dissected layer by layer. Topics include:

- the range of tools and WPF objects available, including:
  - enhancements to the interpreter
  - utilities to make WPF easier to use
  - third-party objects available with Dyalog APL
  - free downloads such as Visual Studio Express
  - sources of information available
- the structure of XAML used, including:
  - linking commands, both standard and user-defined, with APL callbacks
  - linking events with APL callbacks
  - linking XML data sources with menu structures
  - using databinding to link APL data with WPF properties
  - ideas on MVVM (Model View ViewModel) strategies
  - using validation rules as part of the data binding
- considering usage where APL is the driver (*Loose XAML*) and where Visual Studio is the driver (*Compiled XAML*), how the same APL code can be used in both scenarios and where you might consider one over the other

- comparing a simple XAML user-defined class with the same class created using only APL and how they are used.

The aim is to encourage debate on the techniques so that, by the end of the session, you will have the confidence of a general understanding to enable you to start digging deeper into what is possible.

All of the tools and objects used during the session will be freely available with Dyalog APL or through free downloads of Express or open source code.

(TP2) MiServer Masterclass (Thursday 13:30-17:00)
Brian Becker, APL Tools Group Manager

You don't need to be a MiServer Master to attend; this workshop will be informative and useful to those who are new to MiServer as well as old hands. We'll dive into greater detail on some of the features of MiServer 3.0, including, but not limited to:

- deploying MiServer in a corporate environment by running behind IIS or Apache
- database integration
- customising the look and feel of your web site using templates and CSS
- integrating new JavaScript widgets
- developing sites for both desktop and mobile use
- developing advanced web page interaction using APL and AJAX
- content handlers – MiServer comes with handlers for HTML, SOAP, and of course, MiPages…learn how to extend MiServer to support additional resource types.

This is a hands-on, interactive workshop – bring your laptop and come prepared to work!

(TP3) Introduction to SharpPlot (Thursday 13:30-17:00)
Nicolas Delcros

For many years, Dyalog APL for Microsoft Windows has included the RainPro and SharpPlot libraries for the production of high quality business and technical charts – this year, a Linux version of RainPro has become available and is included with Dyalog APL on the Raspberry Pi. These two libraries have essentially the same functionality; SharpPlot started its life as a version of RainPro that is

machine-translated to C# to make it easier to embed in web applications written in C#. However, SharpPlot excels in graphics quality and execution performance, and is much simpler to port between platforms. For these reasons, Dyalog is making SharpPlot the primary product going forwards.

For Version 14.0, Dyalog is working on making SharpPlot portable to all the platforms (current and future) on which APL is available and to providing tools that help users to migrate from RainPro to SharpPlot. We are also working on adding a "Chart Wizard" to help users quickly create the most common chart types using data in the workspace.

This workshop introduces the most important functionality of SharpPlot, demonstrates the RainPro-to-SharpPlot conversion tools and shows a prototype of the Chart Wizard. Bring along your RainPro scripts to migrate them to SharpPlot!

(TP4) Test Driven Development (Thursday 13:30-17:00)
Gianfranco Alongi (Ericsson AB)

Test Driven Development (TDD), also known as Test First Programming, is a programming practice in which the tests are written before any production code. This seemingly reversed way of handling testing and coding leads to easily-tested code (because it was written to pass the tests!), removes gold-plating (code that results from "this could be nice to have..." thinking) and documents assumptions and use-cases (by small and fast tests for specific use-cases of each building block).

Not only does this quickly yield a full set of tests that gives confidence in the code, the code also gets a clearly-defined reason for existing. Through these small "developer tests", we know that the code is written correctly; later, when heavier Function and System Testing are applied, the code can be proven to behave correctly too. These two complement each other very nicely.

This workshop includes a TDD presentation and an introduction to APLUnit (a TDD library for APL). You will then use APLUnit to solve a small problem in a fun format and friendly atmosphere. After practising the fine art of TDD, you will hopefully feel that your life has been enriched in many sensible ways.

Dyalog Presentation Abstracts

(D00) Robot Wars (Sunday 20:30 – 22:00)
Morten Kromberg, Technical Director (CTO)

Dyalog APL is available for the Raspberry Pi and Morten has been trying to control a hardware Pi-based robot with APL since the spring. He will now demonstrate the results of his efforts and talk about the joys that hardware can add to the life of a software developer.

This session will also include the finals and prize ceremony for the "robot race" that is part of the Robot Workshop (SP4) on Sunday afternoon.

(D01) Welcome to Dyalog '13 (Monday 09:30 – 10:00)
Gitte Christensen, Managing Director (CEO)

Dyalog's CEO opens the conference and introduces Team Dyalog.

(D02) Technical Keynote (Monday 10:00 – 10:45)
Morten Kromberg, Technical Director (CTO)

This year the keynote speech will focus on features to be delivered in Version 14.0. Keywords: Performance and parallel computing, modern Graphical User Interfaces, cross-platform application development and delivery.

(D03) The Remote IDE Version 1.0 (Monday 11:15 – 12:00)
John Daintree, Chief Architect & Andy Shiers, Operations Manager (COO)

After several years of prototyping and one complete technology switch, the first version of the RIDE will be delivered next year to accompany version 14.0. The RIDE will provide a graphical development environment on desktops and (in the future) mobile devices, allowing development and debugging of applications running on local or remote Dyalog APL systems.

(D04) Windows Presentation Foundation
(Part I: Monday 13:00 – 14:00, Part II: Monday 15:15 – 15:45)
John Daintree, Chief Architect & Michael Hughes (MJH Software Services Ltd.)

Build State-of-the-art Microsoft Windows desktop applications using Windows Presentation Foundation and SyncFusion Libraries and (from Version 14.0) employ *data binding* to share the content of APL arrays in your workspace with GUI controls (or other Microsoft .Net components).

(D05) Towards Industrial Strength Web Applications (Monday 15:45 – 16:30)
Brian Becker, APL Tools Group Manager

Over the last few years, MiServer has evolved from an experimental web server framework to a web development platform with a handful of users using it to build simple web applications. At Dyalog we have used MiServer as the basis for TryAPL.org and the Dyalog File Server (DFS) console. Based on feedback from users and reviewers, Version 3.0 introduces a new object-based programming model to allow the creation of rich user interfaces while minimising or eliminating the need for the user to learn JavaScript. The goal is to bring the development of industrial strength web/mobile apps within reach of all APL developers.

(D06) Version 14.0 File System Enhancements (Monday 16:45 – 17:30)
Richard Smith, Development Manager

Starting with the introduction of *large span* component files in version 10.1 (in 2004), Dyalog has incrementally enhanced the component file system on each new release. Version 14.0 is no exception, with an emphasis on improved performance and some new functionality. Ten years after the introduction of large span component files, Version 14.0 removes some legacy support for older *small span* files – but Dyalog remains committed to making them accessible in all new releases for a further ten years. This presentation will briefly review the functionality prior to Version 14.0, explore the features introduced at 14.0 and suggest some further enhancements that might see the light of day in the future.

(D07) Parallel Language Features in Version 14.0 (Tuesday 08:30 – 09:00)
Morten Kromberg, Technical Director (CTO) & Jay Foad

Version 14.0 will include three new language features designed to support parallel programming – *futures*, *isolates*, and the *parallel* operator. The goal is to make it easy to express parallel sections of algorithms in a "deterministic" fashion, without locks or semaphores.

(D08) Rank and Friends *(Tuesday 09:00 – 09:30)*
Roger Hui

Function *rank* was first described by Ken Iverson in the 1978 IBM publication "Operators and Functions". Its utility was greatly enhanced by the invention of the *rank* operator by Arthur Whitney in July 1982 and described by Iverson in the I.P. Sharp publication "Rationalized APL" in January 1983. The *rank* operator provides for the generalisation a function to higher-rank arrays and for its consistent application to lower-rank arrays, and is a simpler alternative to the bracket-axis operator. It also provides a generalisation of scalar extension. Version 14.0 adds this powerful tool of thought to Dyalog APL, together with a handful of related features – the *key* operator (which applies the operand function to data grouped according to key values), the *tally* function and the extension of *index of* to higher-rank left arguments. This presentation reviews the final version 14.0 specifications for these features and moves on to discuss their benefits for application programmers.

(D09) Train Spotting in Version 14.0 (Tuesday 09:30 – 10:00)
John Scholes

The *Function Train* is a new syntax construct, supported in Version 14.0, which assigns meaning to expressions of juxtaposed functions in isolation. For example, the expression `x(f+g)y`, where the parentheses surround a *fork*, is equivalent to `(x f y)+(x g y)`; and `x(f g)y`, where the inner expression is pronounced *f atop g*, is equivalent to `f(x g y)`. The J language has supported these constructs for many years and they have been shown to add significant expressive power to the language, simplifying the translation of mathematical expressions into executable code through *tacit programming*. This presentation demonstrates the benefit of trains and gives examples of how they occur naturally when coding APL.

(D10) Reducing Interpreter Overhead (Tuesday 10:30 – 11:15)
Jay Foad

Long-term investigations into interpreter overhead (essentially the time spent selecting what needs to be done as opposed to actually performing the core operation of a primitive function such as +) have resulted in enough progress being made in this area to consider including the outcome in Version 14.0. For example, for small functions (which are usually called with small arguments), significant speed improvements have been achieved. Find out about the discoveries to date and the implications they could have for your projects.

(D11) Primitive Performance (Tuesday 15:45 – 16:30)
Morten Kromberg, Technical Director (CTO) & Roger Hui

With each recent release a large amount of time has been spent tuning primitive functions and operators, and Version 14.0 is no exception. This session will present a preview of the "performance profile report" that Dyalog intends to produce for each future release, followed by a review of the most important performance improvements, including faster ways of doing common tasks using constructs new to Version 14.0.

(D12) Dyalog File Server Version 2.0 (Tuesday 16:45 – 17:30)
Morten Kromberg, Technical Director (CTO)

The second release of the DFS is in the final stages of preparation. New features include the ability to take backups of (and restore) component files while the server is running, support for native files and a performance monitor.

(D13) Social Skills for Programmers (Tuesday 20:30 onwards)
John Scholes

John has point-blank refused to provide further information regarding this session…

(D14) Interfaces to R, Q and NAG (Wednesday 08:30 – 09:00)
Morten Kromberg, Technical Director (CTO)

R is a free software programming language and a software environment for statistical computing and graphics. The R language is widely used among statisticians and data miners for developing statistical software and data analysis – and the popularity of R has increased substantially in recent years.

Q is a powerful query language for high-performance data analysis, based on a kdb+ database. Kdb+ from Kx systems is based on K, an APL variant, and provides a full relational database management system capable of handling data both in memory and on disk. Kx technology is used in finance, energy, telecom, government and other industries that have high-speed database and analysis requirements.

The Numerical Algorithms Group (NAG) is a software company that provides methods for the solution of mathematical and statistical problems and offers services to users of HPC systems. Its products and services are employed by tens of thousands of users including Global 500 companies, universities, supercomputing sites and numerous independent software vendors.

This presentation will review interfaces to R, Q and NAG that are being developed by Dyalog to make these packages easy to use from applications written in Dyalog APL.

(D15) User Command Update (Wednesday 09:00 – 09:30)
Dan Baronet

In addition to reviewing new User Commands that have been added recently, Dan will provide an overview of the current collection of User Commands and present the re-organisation of existing commands that he has been working on for Dyalog APL version 14.0.

(D16) Documenting Dyalog APL (Wednesday 09:30 – 10:00)
Fiona Smith, Documentation Manager

Fiona joined Dyalog in April as our first full-time technical writer. In this presentation she will discuss her plans for existing and new documents as well as looking for input from the user community to help determine prioritisation and requirements for printed and electronic documentation.

(D17) The Future of SharpPlot and RainPro (Thursday 09:15 – 10:00)
Nicolas Delcros

For many years, Dyalog APL for Microsoft Windows has included the RainPro and SharpPlot libraries for the production of high quality business and technical charts – this year, a Linux version of RainPro has become available and is included with Dyalog APL on the Raspberry Pi. These two libraries have essentially the same functionality; SharpPlot started its life as a version of RainPro that is machine-translated to C# to make it easier to embed in web applications written in C#. However, SharpPlot excels in graphics quality and execution performance, and is much simpler to port between platforms. For these reasons, Dyalog is making SharpPlot the primary product going forwards.

For Version 14.0, Dyalog is working on making SharpPlot portable to all the platforms (current and future) on which APL is available and to providing tools that help users to migrate from RainPro to SharpPlot. We are also working on adding a "Chart Wizard" to help users quickly create the most common chart types using data in the workspace.

Invited Speaker and User Presentation Abstracts

(I01) The Syncfusion Libraries (Monday 14:00 – 14:45)
Chad Church, Syncfusion (U.K.)

Tired of the same old battleship grey? Want to make your users go "Wow!"? Then make the jump to WPF. Specifically, Syncfusion WPF. We have controls that will take your application from merely functional to exciting. How about a grid with embedded charts? Charts that let you touch and edit points or zoom and pan - literally - at your fingertips? Come and let me show you how cool your apps could look. All our controls are pixilation free.

(I02) Optimising APL Expressions (Tuesday 11:15 – 12:00)
Eugene Ying, Fiserv (U.S.A.)

In data centres APL can support large processing workloads involving table lookups. In this situation, users can sometimes encounter WS FULL or LIMIT errors and long function runtimes. While WS FULL errors can often be solved with larger workspaces, LIMIT errors are more difficult to overcome.

Commercial APL data processing workloads often use simple arithmetic expressions that are repetitively performed in loops that have millions of iterations.

This presentation introduces:
- a simple way to transform slower and more memory-intensive table lookup algorithms into faster algorithms that use less memory and avoid WSFULL and LIMIT errors
- some simple ways to rearrange these expressions to better optimise APL processing
- some techniques for using scalars to help optimise functions at runtime.

(U03) Cosmos Performance Improvements (Tuesday 13:00 – 13:45)
Paul Grosvenor, Optima Systems (U.K.)

COSMOS is a visualisation tool developed by Optima to allow the observer to look down onto large datasets and "see" hidden meaning. Currently Optima is experimenting with Electronic Medical Records from a variety of sources; any problems working with such datasets quickly come to light. Whilst the COSMOS system itself has been demonstrated at previous conferences, this presentation introduces the audience to some of the techniques now being employed to improve performance and allow the system to be used with ever larger pools of data. For example:

• load balancing
• mapped files
• long vectors
• caching.

(I04) Co-Dfns Compiler (Tuesday 13:45 – 14:30)
Aaron Hsu, University of Indiana (U.S.A.)

Dyalog APL is fast, but faster is always better. The interpreter for Dyalog APL is capable of some nice optimisations thanks to things like idiom recognition, but interpretation naturally limits how much performance is readily accessible. Moreover, the language of dfns presents an ideal opportunity for compilation. This talk presents the Co-Dfns compiler, a new project to develop a compiler for an extended dfns language called Co-Dfns. The presentation includes a demonstration of the current compiler as well as illustrations of how the compiler will help to make Dyalog scale better in performance and reliability. Aaron will also explain how Co-Dfns is designed to take full advantage of modern hardware architectures.

(U05) To Unicode Or Not To Unicode (Tuesday 15:00 – 15:45)
Alexey Miroshnikov, Infostroy Ltd. (Russia)

Implemented in Dyalog APL, The Global Asset Management Assistant (GAMA) is the leading application for asset management in Russia and the Former Soviet Republics. Since the application already handled single-byte but non-ANSI character data, the conversion had a few extra twists.

(U06) Applying Version 13.2 GUI Features to SOFIA (Wednesday 10:30 – 11:15)
Valentina Settimi, APL Italiana (Italy)

In the last few years, with the emergence of new devices like smartphones and tablets, human-computer interaction has undergone fundamental changes. APL Italiana has decided to revise the Sofia GUI to bring it up-to-date.

Since our product is a financial application that is heavily used on a daily basis, we did not want to revolutionise it but instead to renew it; so far we have decided to limit ourselves to use of the new GUI features provided by Dyalog.

By comparing the old GUI and the new GUI of SOFIA, this presentation will demonstrate the use of Native Look & Feel, the enhancements for icons, SysTrayBalloon and Cue controls, explaining the benefits obtained for each one.

(I07) Test Driven Development (TDD) in APL (Wednesday 11:15 – 12:00)
Gianfranco Alongi, Ericsson AB (Sweden)

Gianfranco describes himself as a polyglot software craftsman and passionate functional programmer with a strong interest in agile programming practices and a passion for structure and esoteric topics. He finds great enjoyment in clean code developed using TDD. Since discovering APL a couple of years ago, he has been working on a TDD framework for APL and exercising it to write applications in APL.

(I08) Computer Science Outreach and Education with APL (Wednesday 13:00 – 13:45)
Aaron Hsu, University of Indiana (U.S.A.)

APL was originally a device of the classroom, but most modern uses of it are distinctly industrial in nature. Why not bring APL back to the classroom? This presentation looks at the results of a summer program for high school students to introduce them to computer science. The program was very non-traditional on many fronts and leveraged APL in more than one way. Unlike many programs, students were able to work in multiple disciplines according to their interests and were never taught traditional serial programming. Instead, students used parallel programming in dfns to solve all problems. Moreover, all problems were real world problems instead of toy problems. This presentation will describe the results of the study as well as the theoretical foundations that drove the design of the study. Special consideration is given to the traditional objections to using this language and what has been learnt from observing student interaction.

(U09) How I Won the Dyalog Programming Contest (Wednesday 14:00 – 14:45)
Yanqing Chen, State University of New York (U.S.A.)

Yanqing Chen is the winner of the fifth annual International APL Programming Contest (he placed second in 2011). Following the prize ceremony, he will describe his experiences of Dyalog APL and tell us how he managed to master enough of it to win the competition.

(U10) The Three Blind Pis (Thursday 08:30 – 09:15)
The Mice Who Were Once Called Blind a.k.a. James Greeley, Sam Gutsell & Shaquil Sidiki, Optima Systems (U.K.)

The Three Blind Mice have been working on three different projects developed using Dyalog APL, MiServer and, of course, the Raspberry Pi. Over the past few weeks they have battled with hardware, software, cables, power and sensors but they have now got their devices working. This presentation, given by all three of them, will show what they have done and how they have done it combined with a demonstration of their resulting robots. If all goes to plan you might even be able to have a go yourself! Keep your fingers crossed…

(U11) Cash Flow for Business and Personal Use (Thursday 10:30 – 11:15)
Illse Nell, RiskFlow (South Africa)

Riskflow Technologies developed a financial application, the CFO (Cash Flow Optimizer) that runs on multiple devices (laptops, tablets and mobile phones). The development was cross-platform; the front-end development (Cascading Style Sheets) was done in HTML5, the database is SQL and the back-end (calculations) was developed in Dyalog APL.

This presentation will discuss the development process, from proof of concept to final launch. Many challenges had to be overcome and the way forward is still debatable: should APL be used for more than the calculation engine? The presentation will also include a demonstration of what Riskflow believe is a World-class application.

(I12) The Stormwind Simulator (Thursday 11:15 – 12:15)
Tomas Gustafsson, Stormwind.fi (Finland)

The Stormwind Simulator is a unique "virtual reality" boating simulator for navigation training in the complex archipelago between Finland and Sweden. It presents more than 30,000 square kilometres of "driveable" space to the user as beautiful, almost photo-realistic, scenes, highly reminiscent of the digital games that our children play today. Dyalog APL turned out to be a tremendous tool for coding all of the program logic controlling the middleware 3D-engine and running the game loop in a super-fast manner. Thanks to Dyalog APL, the simulator is essentially a one-man show; only part of the artwork has been outsourced. Users of the simulator include rescue services, defence, coast-guard and oil accident simulations – as well as home users. Mystic secrets of getting a game-like application to work with APL, Windows and DirectX, Microsoft.Net packet transmission utilities and cloud technology might be revealed…

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Design a Poster to Lure the Numerate into Trying APL

The poster could be a picture of some interactions in a session, it could show a piece of APL code or it could show some trace/debugging windows, etc.

Imagine spotting your winning entry while travelling up the escalators on the Bakerloo line!

What first tempted you into a lifetime of APL? Do you remember the excitement that your first foray into APL brought? Fancy yourself as an inspiration for APLers of the future? Then try to recapture some of your original enthusiasm tempered with the experience you've gained since then by entering Dyalog's latest competition…seduce the next generation of potential APLers by enticing them with a brief glimpse into the world that APL has to offer.

Your entry doesn't have to be immediately understandable by non-APLers but it shouldn't be so complex that it puts them off. The idea is to intrigue the uninitiated to the point that they can't resist digging a little deeper until they're hooked! APL makes itself beautiful but your mission, should you chose to accept it, is to make it fun, sexy and irresistible!

The final date for entry is December 1st 2013 – the winner will be announced on December 20th 2013. The prize for the winning entry includes a conference ticket for Dyalog '14, the honour of having your submission added to the Dyalog documentation set, the pride of knowing that you've made APL more appealing than your fellow competitors have and the knowledge that your place in history as the saviour of those who would otherwise be suckered into programming in a lesser language is assured.

The rules:

1. Entries should be emailed to fiona@dyalog.com.
2. Entries should be designed to fit on a sheet of A4 (U.S. Letter size).
3. Entries can be in the form of a workspace, text file or screenshot.
4. Entries must use Dyalog APL, preferably with ⎕ML ⎕IO ← 1.
5. Multiple entries from an individual are allowed.
6. The judges' decision is final.

Practical Information

To make your stay as pleasant as possible, we would like to draw your attention to some practical details. There is also a folder in each guest room containing general information.

Check In and Out
Your room is available from **4pm** on the day of arrival; you will need to check out of the room by **12 noon** on the day of departure. The hotel offers a luggage hold service.

Internet access
Embassy Suites Deerfield Beach offers complimentary wireless high speed internet access in the public areas of the building as well as the guest rooms – you will receive a code when you check in. There is also a Business Centre with complimentary internet access and printing.

Meals and Drinks
The conference fee includes all meals and breaks on conference days.

- The Lunch buffet includes iced tea.
- Dinner includes coffee, tea and water. Wine is available to buy with dinner.
- Wine is included in the Banquet Dinner.
- All guest rooms have a small refrigerator, microwave and coffee maker.

There is a complimentary Evening Reception from 5:30 – 7:30pm each evening offering a variety of alcoholic and non-alcoholic beverages as well as light appetisers. Wine, beer and other alcoholic beverages can be purchased at the main bar in the restaurant, which is typically open until 11pm but can stay open until 1am as long as there are enough customers. Please remember to settle your bar bill when you check out!

Leisure Time
The fitness centre and outdoor pool can be used free of charge. There is also a full service spa and salon inside the hotel – ask at the Spa950 reception for details of charges and to make a reservation. The hotel concierge can supply information about local activities and things to do in the area so please make use of this complimentary service.

Smoking policy
Embassy Suites Deerfield Beach operates a strict non-smoking policy and smoking is not allowed in the main building or the guest rooms (including on the balcony). There are clearly marked dedicated smoking areas on the pool patio and by the front door of the hotel so please use them.