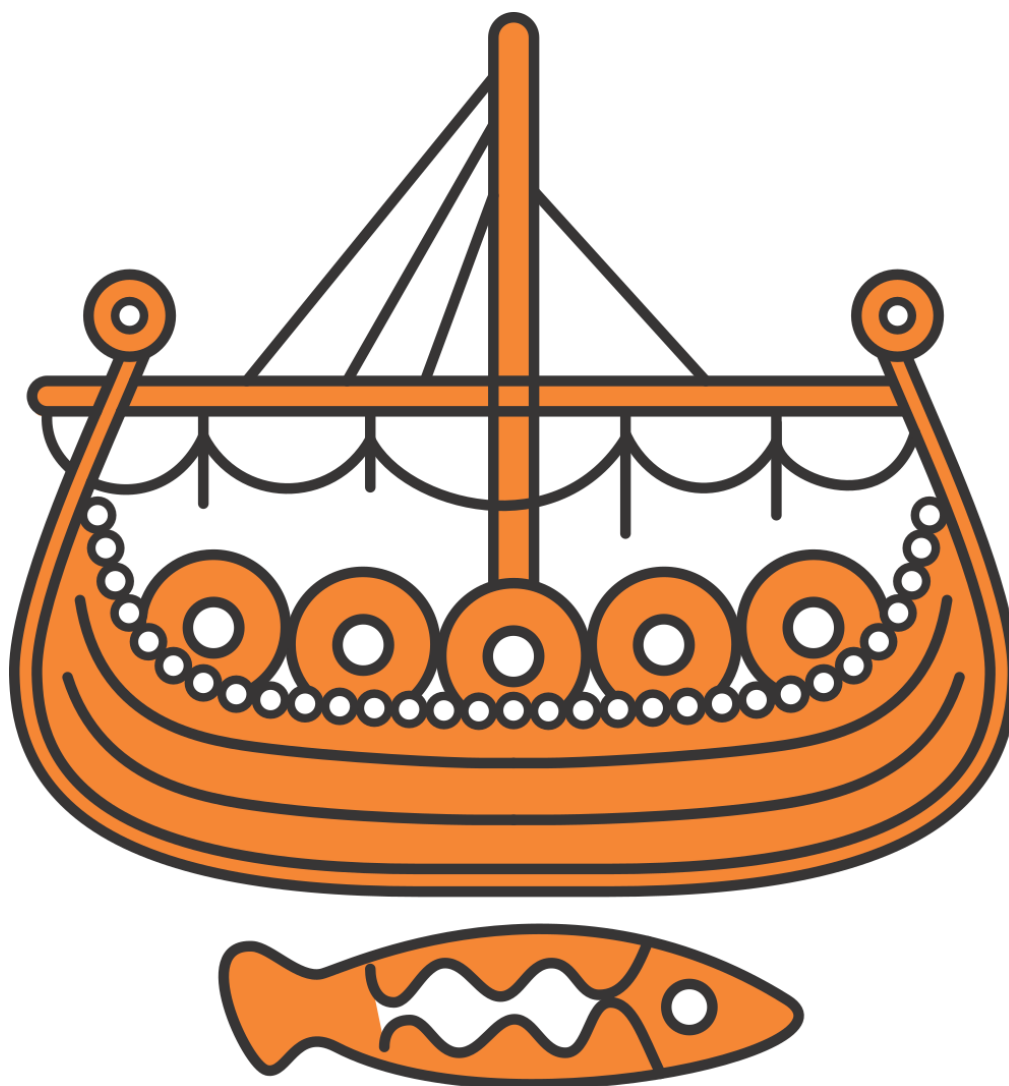# DYALOG

Sicily 2015

Programme for Dyalog '15

Sunday 6 September – Thursday 10 September 2015

Welcome to the Dyalog User Meeting 2015 in Sicily

All of the presentation and workshop materials are available on the Dyalog '15 webpage at http://www.dyalog.com/user-meetings/dyalog15.htm.

As usual, we will be recording and publishing as many presentations as we can (as a presenter you will always have the opportunity to review the recording and approve publication). We would like to ask for your help in ensuring that question and answer sessions are also recorded; you can help by not asking questions unless you are in possession of a microphone.

If your question cannot wait until the Q&A session that concludes each presentation, or if the presenter specifically states that questions are welcome throughout, please raise your hand to indicate that you need the microphone (and then wait until you have it before proceeding).

Naturally, everyone from Dyalog Ltd will be happy to answer questions relating to their topics at any time during the user meeting!

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

Table of Contents

A very warm welcome to our annual user meeting and to Sicily.

At Dyalog we always look forward to these five days of training, presentations and direct encounters with our users, which always give us a boost of inspiration!

We look forward to talking to you about all the work we have been doing recently, and showing you some new features that are in the pipeline – and catching up on what you have been up to lately.

We wish you a good user meeting and hope you will enjoy yourself and that most importantly you will leave Sicily with a renewed network and that one good idea, insight or contact that will mean a difference to you and your organisation in the future!

The Dyalog Team

Your Feedback

We want to ensure that our user meetings meet (if not exceed!) your expectations, and your feedback is critical to this. We're trying a slightly different approach in collecting your feedback this year:

- Each workshop will have its own feedback form, given out at that workshop.

- Feedback forms on the presentations will be distributed each morning and will only cover the presentations given that day.

- Feedback on the venue, facilities, social aspects, etc. can be given at any time at the Dyalog desk in the foyer of the Congress Centre.

You'll notice some changes this year from Dyalog '14 (fewer arranged evening activities, opportunities for "Birds of a Feather" discussion groups, etc.) that are a direct result of last year's feedback. Please do take the time to let us know your thoughts on Dyalog '15 – what you like, what you find most interesting, your suggestions for improvements, whether our changes this year have been successful, etc. – so that we can take these into account when planning future user meetings.

Thank you

Follow us on:
- FaceBook (https://www.facebook.com/DyalogAPL)
- LinkedIn (https://www.linkedin.com/company/dyalog-ltd-)
- Twitter (https://twitter.com/DyalogAPL)

Birds of a Feather Discussion Groups

A Birds-of-a-Feather session is an open, face-to-face conversation with fellow user meeting attendees. It is not a presentation or lecture (there is no projector and there are no slides) or a problem-fixing session but rather a discussion, and provides the opportunity to find and engage with others who share your interest in a subject area.

Each Birds-of-a-Feather session has a host who gets the discussion started and keeps it moving around the group. The host is not the person with all the answers (or all the questions). Asking questions, offering answers, exploring possibilities and sharing opinions is everyone's job!

We're offering three of these discussion groups on Monday evening. Those interested in participating should meet their host in the Olympus bar at 21:00.

The discussion topics on offer are:

- Functional Programming
  host: John Scholes

- APL on the web, MiServer, providing and consuming Web services
  host: Brian Becker

- WPF, .NET and databinding
  host: John Daintree

Team Dyalog at Dyalog '15

This year, Dyalog Ltd is represented by 20 members of the current team (since Dyalog '14 we've lost Jonathan but gained Adám).

Our newest team member, Adám (adam@dyalog.com)

Useful Dyalog e-mail addresses:

- usermeeting@dyalog.com
  any user meeting-related issues, both technical and non-technical

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

- support@dyalog.com
  any technical questions concerning Dyalog (not user meeting-specific)

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

Sunday 6 September: Schedule

08:30 – 09:30	Registration (Dyalog desk in foyer of Congress Centre)
09:30 – 13:00 includes breaks (10:30 – 11:15 tea and coffee available)	Workshops **(SA1) Building a WPF Application: I** *Sala Vulcano* Michael Hughes (from MJH Software Services Ltd.) asst. John Daintree **(SA2) Building a Web Application with MiServer: I** *Sala Stromboli* Brian Becker asst. Bjørn Christensen **(SA3) Parallel Programming with Futures/Isolates: I** *Sala Lipari* Morten Kromberg asst. Adám Brudzewsky **(SA4) Recent Language Features in Practice** *Sala degli Affreschi* Dan Baronet asst. Nick Nickolov
13:00 – 14:00	**LUNCH** Oasys Restaurant (in main hotel)
14:00 – 17:30 includes breaks	Workshops **(SP1) Building a WPF Application: II** *Sala Vulcano* Michael Hughes (from MJH Software Services Ltd.) asst. Dan Baronet

(15:00 – 15:45 tea and coffee available)	**(SP2) Building a Web Application with MiServer: II** *Sala Stromboli* Brian Becker asst. Bjørn Christensen **(SP3) Parallel Programming with Futures/Isolates: II** *Sala Lipari* Morten Kromberg asst. Adám Brudzewsky **(SP4) "The Doctor Is In"** *Sala degli Affreschi* Andy Shiers John Daintree
17:30 – 19:30	Free time
19:30 – 20:30	**DINNER** Oasys Restaurant (in main hotel)
20:30 –	*INFORMAL GATHERING* *Olympus Bar (part of Olympus Café)* *Cash bar. Live music from 21:00.*

For workshop abstracts, see pages *18-23*.

NOTES:

Monday 7 September: Schedule

All presentations take place in the *Congress Centre.*

08:30 – 09:30	Registration (Dyalog desk in foyer of Congress Centre)
09:30 – 10:00	**(D01) Welcome to Dyalog '15** Gitte Christensen, Managing Director (CEO)
10:00 – 10:30	**(D02) Technical Road Map** Morten Kromberg, Technical Director (CTO)
10:30 – 11:00	TEA/COFFEE (Congress Centre terrace)
11:00 – 11:30	**(D03) RIDE: A New Way to Interact with the Interpreter** Nick Nickolov
11:30 – 12:30	**(U01) Premium Capping Schemes: An Important Steering Mechanism in German Health Insurance** Markos Mitsos (ERGO)
12:30 – 13:30	**LUNCH** Oasys Restaurant (in main hotel)
13:30 – 14:15	**(D04) Core Performance** Roger Hui & Jay Foad
14:15 – 14:40	**(D05) User Commands Update** Dan Baronet & Adám Brudzewsky
14:40 – 15:00	**(D06) MyDyalog and Other Backroom Processes** Andy Shiers
15:00 – 15:30	TEA/COFFEE (Congress Centre terrace)
15:30 – 16:00	**(D07) Cross-platform User Interfaces** Morten Kromberg
16:00 – 16:30	**(D08) Cross-platform File Functions** Richard Smith
16:30 – 16:45	Short break
16:45 – 17:30	**(U02) The Importance of Communication, Transparency and Practice** Gianfranco Alongi (Ericsson AB)

17:30 – 18:15	**(D09) Dya(b)log** Fiona Smith
18:15 – 19:30	Free time
19:30 – 21:00	**DINNER** Oasys Restaurant (in main hotel)
21:00 –	Birds Of A Feather Discussion Groups Meet your chosen topic's host in the Olympus bar (see page *6*)

For Dyalog presentation abstracts see pages *24-29*.
For invited speaker and user presentation abstracts see pages *30-35*.

NOTES:

Tuesday 8 September: Schedule

All presentations take place in the *Congress Centre.*

09:00 – 09:45	**(D10) MiServer UI Controls** Dan Baronet & Adám Brudzewsky
09:45 – 10:30	**(U03) Mining the Depths of Excel – a Case Study in Objects and Arrays** Richard Procter (APL Borealis)
10:30 – 11:00	TEA/COFFEE – Congress Centre terrace
11:00 – 11:45	**(U04) How to Save an Italian School with APL** Roberto Minervini with Arianna Greco, Samuele Luigi Di Gioia, Kariman Ahmed & Silvana Maria Belén Colman Cabrera (Liceo Classico S.M. Legnani)
11:45 – 12:30	**(U05) APL Really Can Make Us Healthy(er)!** Paul Grosvenor (Optima Systems)
12:30 – 13:30	**LUNCH** Oasys Restaurant (in main hotel)
13:30 – 14:15	**(U06) Ants, AJAX and APL** Ray Cannon (Cannon Computer Consultancy Ltd)
14:15 – 14:45	**(D11) The Dyalog Project Project** Morten Kromberg
14:45 – 15:00	**(U07) APL Array Notation** Phil Last (Independent APL Programmer)
15:00 – 15:30	TEA/COFFEE (Congress Centre terrace)
15:30 – 16:15	**(D12) Data Binding – The Matrix** John Daintree
16:15 – 16:30	**(U08) Data-bound Dashboard** Alexey Miroshnikov (InfoStroy Ltd)
16:30 – 16:45	**(D13) External Workspaces** Morten Kromberg & Stig Nielsen (SimCorp)
16:45 – 17:00	Short break

17:00 – 17:15	**(U09a) How I Won the Dyalog Programming Contest – Introduction and Award Ceremony** Brian Becker
17:15 – 18:00	**(U09b) How I Won the Dyalog Programming Contest** Arianna Locatelli (Liceo Classico S. M. Legnani)
18:00 – 19:30	Free time
19:30 – 21:00	**DINNER** Oasys Restaurant (in main hotel)
21:00 –	**(D14) Waste Time with John Daintree** Evening entertainment

For Dyalog presentation abstracts see pages *24-29*.
For invited speaker and user presentation abstracts see pages *30-35*.

NOTES:

Wednesday 9 September: Schedule

All presentations take place in the *Congress Centre.*

09:00 – 09:45	**(U10) Abstract Expressionism for Parallel Performance** Robert Bernecky (Snake Island Research)
09:45 – 10:30	**(D15) Compilation and Bytecode Execution** Jay Foad
10:30 – 11:00	TEA/COFFEE – Congress Centre terrace
11:00 – 11:45	**(U11) Using Co-dfns to Accelerate APL Code** Aaron Hsu (Indiana University)
11:45 – 12:30	**(U12) Troubles with Strange Data Structures and Database Growth** Francesco Garue (APL Italiana)
12:30 – 13:30	**LUNCH** Oasys Restaurant (in main hotel)
13:30 – 18:00	**EXCURSION** Meet in front of the hotel's main reception by 13:30. Please be on time as the schedule is very tight and wear comfortable shoes suitable for walking
18:00 – 19:30	Free time
19:30 – 20:00	**PRE-PRANDIAL DRINKS RECEPTION** In the garden by the Stella di Mare restaurant
20:00 –	**BANQUET BY THE BEACH** The Stella di Mare Restaurant Dress code: smart but not formal

For Dyalog presentation abstracts see pages *24-29*.
For invited speaker and user presentation abstracts see pages *30-35*.

Excursion

No axe throwing or 007 trials this year; instead, the Viking Challenge is an opportunity for adventure! Join us for a coach trip to visit Mount Etna.

Mount Etna, at approximately 3,330 metres (c10,000 ft), is Europe's highest and most active volcano; it dominates the island of Sicily and its three surrounding seas. The almost constant state of activity produces fertile volcanic soils; these support extensive agriculture, with vineyards and orchards spread across the lower slopes of the mountain and the broad Plain of Catania to the south.

In classical mythology, the forge of Hephaestus/Vulcan (Greek/Roman god of blacksmiths, craftsmen, artisans, sculptors, metals, metallurgy, fire and volcanoes) was said to be located beneath Mount Etna. Rumours of a hobbit trying to dispose of magical jewellery here have not been substantiated.

Read more about Mount Etna at https://en.wikipedia.org/wiki/Mount_Etna

NOTES:

Thursday 10 September: Schedule

All presentations take place in the *Congress Centre.*

09:15 – 10:00	**(D16) Future Operator Proposals: Cut, Under & Merge** Roger Hui & John Scholes
10:00 – 10:30	**(D17) SharpLeaf : Flowing Automated Reports to Paper** Nicolas Delcros
10:30 – 11:00	TEA/COFFEE – Congress Centre terrace
11:00 – 11:45	**(D18) Uncle Andy's Fireside Chat v2.0** Andy Shiers
11:45 – 12:30	**(U13) TamStat, a Statistical Package** Steve Mansour (The Carlisle Group and University of Scranton) & Jerry Brennan (Jerry M Brennan PhD Inc)
12:30 – 13:00	**Open Forum and Closing Session** Team Dyalog
13:00 – 14:00	**LUNCH** Oasys Restaurant (in main hotel)
14:00 – 17:30 includes breaks (15:00 – 15:45 tea and coffee available)	Workshops **(TP1) Excel Mining – Exploiting Microsoft Excel's Open XML Structure** *Sala Vulcano* Richard Procter (from APL Borealis) asst. John Daintree **(TP2) Accessing External Data from Dyalog** *Sala degli Affreschi* Dan Baronet asst. Adám Brudzewsky

	(TP3) Creating and Managing Dyalog-based Services *Sala Stromboli* Brian Becker asst. Andy Shiers **(TP4) Writing Efficient Code in Dyalog** *Sala Lipari* Roger Hui asst. Nick Nickolov

For workshop abstracts, see pages *18-23*.
For Dyalog presentation abstracts see pages *24-29*.
For invited speaker and user presentation abstracts see pages *30-35*.

NOTES:

Workshop Abstracts

These workshops have significant time set aside for participants to experiment with the subject matter.

Some of the workshops require materials that should be installed on your laptop as a pre-requisite of attendance. These pre-requisites are listed by workshop at www.dyalog.com/user-meetings/dyalog15/prerequisites.htm. Please ensure that you meet these pre-requisites before attending a workshop if at all possible.

SA1: Building a WPF Application: Part I
Sunday 09:30 – 13:00
Michael Hughes (from MJH Software Services Ltd.)
asst. John Daintree

At the end of the two "Building a WPF Application" workshops, participants will have a small, working WPF application to take away, along with a practical understanding of using WPF with Dyalog.

The workshop is practical with a heavy reliance on "doing" rather than just "listening". It is divided into two halves:

- Part I (SA1): Demos and Tutorials
- Part II (SP1): Hands-on session in which knowledge from Part I will be assumed.

Particular emphasis will be given to:

- Native controls as well as third-party controls from Syncfusion and MJH Software (emulation of the APL Grid)
- WPF utility workspace from MJHSoftware
- Data Binding (this will permeate the two sessions)
- Templating
- Routed events/commands, leading to building a menu for an application
- Familiarisation with XAML, as well as APL, usage of WPF
- Using the online Help available

Part I comprises three sessions:

- Session 1: Introduction and demonstration of the functionality of the solution.
- Session 2: Walkthrough/demonstration of implementation details, tools used, techniques used (such as Data Binding, XAML), etc.
- Session 3: Learning how to read WPF and 3rd party documentation through a practical challenge of making a small change to an application.

SA2: Building a Web Application with MiServer: Part I
Sunday 09:30 – 13:00
Brian Becker (Tools Group Manager)
asst. Bjørn Christensen

MiServer is Dyalog's APL-based web application framework allowing you to develop cross-platform applications for stand-alone use or delivery via the web. MiServer 3.0 enables APL users to develop HTML5/JavaScript applications without requiring an in-depth knowledge of those technologies. In this hands-on workshop, we will install and run MiServer, learn to build interactive web pages, implement event handling and learn about implementing web services.

SA3: Parallel Programming with Futures and Isolates: Part I
Sunday 09:30 – 13:00
Morten Kromberg (Technical Director)
asst. Adám Brudzewsky

Futures and isolates were introduced in Dyalog version 14.0. These language features are designed to make it straightforward to harness all the cores that your computer (or cluster of computers) has available, whether you are writing a brand new application or need to speed up legacy code. In this hands-on workshop we will introduce these new language features, with plenty of time for exercises to allow you to immediately practise new-found skills.

SA4: Recent Language Features in Practice

Sunday 09:30 – 13:00
Dan Baronet
asst. Nick Nickolov

Familiarise yourself with some of Dyalog's language features, focusing on more recent ones like the *Rank* (⍤) and *Key* (⌸) operators introduced in Dyalog version 14.0.

Aimed primarily at those people who are planning to use (or simply want to improve their understanding of) these features, several problems of varying difficulty will be solved as we explore the possibilities that recent language features bring to Dyalog.

SP1: Building a WPF Application: Part II

Sunday 14:00 – 17:30
Michael Hughes (from MJH Software Services Ltd.)
asst. Dan Baronet

At the end of the two "Building a WPF Application" workshops, participants will have a small, working WPF application to take away, along with a practical understanding of using WPF and Dyalog.

The workshop is practical with a heavy reliance on "doing" rather than just "listening". It is divided into two halves. Part II is a hands-on session in which knowledge from Part I will be assumed.

Part II comprises three sessions:

- Session 1: Making simple changes to the application, confirming understanding of Part I.
- Session 2: Making one major extension to the application – significant independent work.
- Session 3: Advanced topics, including further information on Data binding, Templating and other design possibilities (if time permits).

SP2: Building a Web Application with MiServer: Part II
Sunday 14:00 – 17:30
Brian Becker (Tools Group Manager)
asst. Bjørn Christensen

Following on from the morning's introduction (workshop **SA2**), in this hands-on workshop we'll build a web application – either transforming an application you bring to run under MiServer, or using a sample application we provide. We will examine different strategies for deploying applications with MiServer including stand-alone, running within the corporate infrastructure or as a web service. Topics covered will include creating look and feel with styling and using widgets to produce rich user experiences.

SP3: Parallel Programming with Futures and Isolates: Part II
Sunday 14:00 – 17:30
Morten Kromberg (Technical Director)
asst. Adám Brudzewsky

Following on from the morning's introduction (workshop **SA3**), this workshop provides time and space for actual application development. We will analyse a worked example in depth, but the bulk of the afternoon will be set aside for you to work on your own application with help from experts and the other workshop participants (if you are willing to display your code). Bring your own application along, or build one during the afternoon session (if you don't have one, some exercises will be provided).

SP4: "The Doctor Is In"
Sunday 14:00 – 17:30
Andy Shiers (Operations Manager), John Daintree (Chief Architect) & friends

Pop in to the APL surgery!

In previous user meetings you have always been welcome to talk to any of the Dyalog team about your APL/Dyalog problems (and ideas). That hasn't changed this year (and is unlikely to in future user meetings either!) but we thought that this year we'd also put some specific time aside for this. In this workshop Andy, John and others are available without other distractions. There's no fixed plan, but we would like to get to talk to as many people as possible, so if you have a very involved issue we might ask to continue the discussion at some other time.

NOTE: This session will continue after the end of the other workshops, so don't worry if you want to attend one of them…go to the other workshop and either pop in to see us afterwards or we can always try to find time to talk during the week.

We don't guarantee to solve your issue there and then, but we can try – and that can make a big difference!

TP1: Excel Mining – Exploiting Microsoft Excel's Open XML Structure
Thursday 14:00 – 17:30
Richard Procter (from APL Borealis)
asst. John Daintree

This workshop covers a range of techniques that can be used to move data back and forth between an APL workspace and Microsoft Excel. Starting with a brief review of the former standard methods, including ***.csv** files and COM automation, the bulk of the session will be spent exploring Excel's open XML-based structures. We will use some readily-available class libraries as part of identifying the best practices for converting Excel spreadsheets to APL arrays and vice versa; these include the Syncfusion XLsIO library (included with recent versions of Dyalog); a handy utility suite based on that library, and another approach using Microsoft's Open XML SDK. These object-oriented tools work well but can have limitations in some cases. We will learn how to deal with these limitations by putting the array-oriented speed and simplicity of APL to work.

A basic understanding of the use of .NET techniques in APL will be helpful but is not a requirement.

TP2: Accessing External Data from Dyalog
Thursday 14:00 – 17:30
Dan Baronet
asst. Adám Brudzewsky

Not all data is held within workspaces – often it is contained within external data files such as Microsoft Excel files, CSV files or XML files. This workshop reviews the different ways in which data outside the workspace can be accessed. There will be several examples and problems to be solved using each of the aforementioned external data files as well as JSON files, Web services, databases and native and component files.

TP3: Creating and Managing Dyalog-based Services

Thursday 14:00 – 17:30
Brian Becker (Tools Group Manager)
asst. Andy Shiers

In this workshop we'll look at setting up Dyalog applications to run as Microsoft Windows services and using daemons under Linux. We'll explore a variety of topics including architectural changes for running as a service, managing services, and usage and error logging. We'll also delve into performance and load balancing by running Dyalog applications using multiple processes, either on a single platform or across multiple platforms. A sample service will be provided for you to deploy and experiment with.

TP4: Writing Efficient Code in Dyalog

Thursday 14:00 – 17:30
Roger Hui
asst. Nick Nickolov

This workshop is divided into two sections, each looking at different aspects of coding efficiency.

Part I – Performance Tips: A review of performance tips and rules of thumb useful for writing efficient code.

Part II – Special Code: Many primitives contain special code for certain arguments to effect time and/or space savings not available to general arguments; moreover, some phrases are recognised and are supported by special code (these are in addition to idioms). We explore this special code with emphasis on the newer constructs offered by Dyalog.

Dyalog Presentation Abstracts

D01: Welcome to Dyalog '15
Gitte Christensen, Managing Director (CEO)

Dyalog Ltd's CEO opens the user meeting.

D02: Technical Road Map
Morten Kromberg, Technical Director (CTO)

The Road Map provides a high-level view of recently completed projects and active development, and a declaration of intent with respect to the areas where Dyalog Ltd is likely to invest significant energy in the next few years.

Keywords in 2015: cross-platform application development, new development tools, and (as always) performance.

D03: RIDE: a New Way to Interact with the Interpreter
Nick Nickolov

The RIDE (Remote Integrated Development Environment) is a graphical front end that can be used to develop and maintain Dyalog applications, irrespective of the computer that the Dyalog engine is running on. Nick explains how you can make the most of RIDE's latest features and enhance your coding comfort and efficiency by customising the default keystrokes, characters, and colours.

D04: Core Performance
Roger Hui and Jay Foad

Recent and future versions of Dyalog benefit from several implementation techniques, including:
- range finding with vector instructions
- CRC hashing
- special codes in operators
- magic functions
- special code for $\square CT=0$
- upgrading C compilers

Roger and Jay will discuss these techniques and the impact they have on the performance of the interpreter.

D05: User Commands Update
Dan Baronet & Adám Brudzewsky

This presentation concentrates on the latest changes to user commands. Particular emphasis is given to the new `]CopyReg` command (introduced at version 2.01 with Dyalog version 14.1), which enables a Microsoft Windows user to copy configurations from one version of Dyalog to another.

D06: MyDyalog and Other Backroom Processes
Andy Shiers, Operations Manager (COO)

Andy highlights some of the new features that have been added to MyDyalog or will be available in the near future, and explains some of the changes to the way in which updates are supplied, etc. Much of what he describes in this talk is Jason Rivers' work (Andy is presenting it since Jason is tied up with AV duties this week); if you have any feedback on MyDyalog then please let Jason know.

D07: Cross-platform User Interfaces
Morten Kromberg, Technical Director (CTO)

In 2015, Dyalog released the first version of Dyalog APL for Mac OS, and other platforms will be targeted in the near future. Cloud deployment provides opportunities to deliver web applications on both Microsoft Windows and Linux. An important challenge is to find a mechanism that can make it straightforward to develop user interfaces to run on all these platforms with a minimum of effort.

D08: Cross-platform File Functions
Richard Smith, Development Manager

Popular modern programming languages benefit from access to good quality, community-built, code libraries. However, there has been no great tradition of this in the APL community; this is something that Dyalog wishes to address.

The interpreter can exchange data and workspaces between different platforms with ease – but has also evolved in ways that make it difficult to distribute a single, portable, code library. For example, filename extensions are different on Microsoft Windows and non-Windows platforms, and code that wants to access the underlying host file system often has to invoke non-portable host commands to do so.

Dyalog version 14.1 addressed some of the problems of filename extensions. Version 15.0 is expected to take this further and also introduce new system functions to allow greater access to the underlying file system. Richard explains the changes that have been made and those that are being planned and the thinking behind them.

D09: Dya(b)log
Fiona Smith, Documentation Manager

Following a brief review of Dyalog's social media, Fiona turns her attention to one of the main channels through which we communicate with the world – the Dyalog blog. Contributed to by all members of Team Dyalog, posts range from the highly intellectual to the rather more frivolous and cover topics as diverse as explorations of language elements, recollections of why APL evolved in the way it did, personal musings on the future of APL, solutions to previous student competition questions, travelogues and (of course!) the Dyabot. Fiona concentrates on three particular blog posts from the last 12 months and asks the authors of those posts to summarise and take questions/feedback on their musings. Up for discussion are:

- [Name colouring for dfns](#)
  John Scholes – published 27 May 2015
- [Zero-length Regular Expression Matches Considered Harmful](#)
  Richard Smith – published 9 February 2015
- In Praise of Magic Functions – [Pt I](#) and [Pt II](#)
  Roger Hui – published 22 & 29 June 2015

D10: MiServer UI Controls
Dan Baronet & Adám Brudzewsky

User Interface controls, form elements, widgets – these create the end user experience for an interactive application. MiServer, Dyalog's framework for building cross-platform, browser-based applications, has an ever-growing library of UI controls. These include popular JavaScript libraries, to which Dyalog has provided interfaces to make them easily and naturally accessible to the APLer. In this presentation, Dan and Adam demonstrate and discuss several of the available controls, from those necessary to build simple input forms to more elaborate data visualisation widgets. For those who build interactive applications, this session will provide an understanding of the scope and capability of the MiServer widget library.

D11: The Dyalog Project Project
Morten Kromberg, Technical Director (CTO)

Dyalog intends to develop new tools for application development. A central idea is the notion of a shared definition of a "Dyalog Project": a mechanism for declaring the source code components that an application is built from and *build directives* to build and deploy different variants or sub-sets of the application, for different uses or target platforms. Future tools are likely to revolve around such "project definitions", which need to be sufficiently flexible to allow new users to ask for "A New Dyalog Web Application" and have it up and running in minutes, and still describe legacy applications well enough to allow selected tools to be brought to bear on them.

Keywords: Source Code Management, Dependency Management, Building and Deploying applications.

D12: Data Binding – The Matrix
John Daintree, Chief Architect

Databinding has been extended to support binding to matrices. John demonstrates this, along with more ideas for databinding in the future.

D13: External Workspaces
Morten Kromberg, Technical Director (CTO) & Stig Nielsen, SimCorp (Denmark)

An External Workspace is a workspace saved in a new format that allows an application to page code and data into the active workspace on demand, rather than loading the entire workspace when the application starts. The files are memory mapped, which means that processes running on the same machine can share the memory used by the parts of the workspace which have been *paged in*, and the file is only read by the first process that uses any particular function or variable.

SimCorp Dimension is a rapidly growing application. At run time, code is usually loaded from a network drive. The time required to load the workspace and subsequently to page code in from component files is also steadily growing. Details of the implementation of External Workspaces at SimCorp will be discussed – including some timings.

D14: Waste Time with John Daintree
John Daintree, Chief Architect

Get your geek on with John Daintree as he has a devil of a time with JSON and Databinding. May contain images of partial nudity…

D15: Compilation and Bytecode Execution
Jay Foad

Dyalog version 14.0 included an experimental compiler for APL functions, allowing you to compile functions ahead of time and run them with an optimised bytecode execution engine. Dyalog version 14.1 greatly extended the support for compiling tradfns and for functions that reference other global functions, variables and constants. Jay will demonstrate these features and describe further improvements that are planned for the future.

D16: Future Operator Proposals: Cut, Under and Merge
Roger Hui & John Scholes

Three operators are presented to stimulate discussion and feedback from the user community. Roger opens with:

- *Cut*: A dyadic operator that applies a function to the data cut by a leading or trailing separator, to a tessellation of the data, or to a rectangle in the data.
- *Under* (AKA *dual*): A dyadic operator f⍢g where

    f⍢g ω ↔ g⍣¯1 f g ω
    α f⍢g ω ↔ g⍣¯1 (g α) f (g ω)

    That *under* is a superior tool of thought is illustrated through examples.

John then looks at *merge*, exploring some suggestions for the functional merging of arrays as alternatives to the procedural mechanism of indexed and selective assignment.

D17: SharpLeaf : Flowing Automated Reports to Paper
Nicolas Delcros

SharpLeaf is a typesetting and tabulation engine that allows automated production of high-quality reports using a simple yet powerful API. It is the replacement for NewLeaf, and will be bundled within the SharpPlot package. Nic takes us through why and how to use it.

D18: Uncle Andy's Fireside Chat v2.0
Andy Shiers, Operations Manager (COO)

Last year Andy spoke about some of the new(ish) or lesser-known little features of Dyalog that are buried deep in the documentation. There's plenty that he didn't mention, and even more with Dyalog version 14.1, so he's back with the second in a potentially never-ending series of conversations…

As ever, let us know if there are any features that you think would make Dyalog easier to use.

Invited Speaker and User Presentation Abstracts

U01: Premium Capping Schemes: An Important Steering Mechanism in German Health Insurance

Markos Mitsos, ERGO (Germany)

The calculation of premiums in German health insurance is based on some fundamental actuarial tables, an expected long term average interest and the premise that the individual premium shall not depend on aging itself, but only on the age at contract date. Once tight regulations are also taken into account, the business model of German health insurance is built around (huge) benefit reserves and security margins. Its surplus stems mainly from interest on reserves (above the technical interest rate) and security margins. German law requires insurance companies to give back to the policyholders at least 80% of the entire surplus within 3 years. This has to be done after agreement with an independent trustee.

One of the two main ways to use the accumulated surplus is to cap premium increases during recalculation of premiums. Simulating this is complicated because capping is highly individual and needs the recalculation of all (individual) premiums as a pre-requisite. The calculations are straightforward but consist of a very large number of simple arithmetic operations.

The main challenge is to reliably achieve high accuracy, while keeping computation time in the limits needed for high flexibility. Furthermore it may not be obvious at all what a "fair" distribution of funds means and what the right capping scheme may look like, so a substantial amount of output information is needed.

Using APL, different capping models can be simulated on the basis of one premium recalculation simulation, using – as far as possible – 4-byte integer main arrays and pure vector and matrix calculations. The resulting computation times allow the simulation of many models. Furthermore, the costs of a model complete with error margins can be estimated within seconds.

U02: The Importance of Communication, Transparency and Practice
Gianfranco Alongi, Ericsson AB (Sweden)

To maximise our potential as individuals, teams and (ultimately) organisations, we have to take a step back from all of the enabling technologies, processes and tools that surround us and look inwards instead. In this presentation, Gianfranco shows us how to do this by touching on three subjects that start with "you and me" at the centre – Communication, Transparency and Practice.

U03: Mining the Depths of Excel – a Case Study in Objects and Arrays
Richard Procter, APL Borealis (Canada)

For those who need to move data back and forth between APL and Microsoft Excel, the options are growing. With Microsoft Office 2007, Excel and other Office documents adopted an open, XML-based file format. From an APL perspective, XML is nothing more than a delimited string of text – and we know how to handle such things in APL (in addition to which we have ⎕XML). Several object-oriented, .NET-driven class libraries exist for manipulating ***.xlsx** files without the need for Excel itself. These include Syncfusion's XLsIO, which is now provided by, and integrates easily with, Dyalog. Office Automation, using COM techniques, still works but has its limitations (and, of course, still requires Excel to be installed). The newer XML-based tools also have limitations, some of which can be overcome with familiar APL array-oriented magic.

U04: How to Save an Italian School with APL
Roberto Minervini, Liceo Classico S.M. Legnani (Italy) with Arianna Greco, Samuele Luigi Di Gioia, Kariman Ahmed & Silvana Maria Belén Colman Cabrera

Could APL be a good approach to teaching maths/programming in a secondary school?

Roberto tried to answer this question, and he and some of his students tell the story of the APL course used at the school over the last few months. The scene is set with a description of how maths/programming was taught in the Liceo Classico S.M. Legnani secondary school before APL was involved, and the resultant problems. They then explore how maths (both teaching it and learning it) can be completely revolutionised with the introduction of APL.

U05: APL Really Can Make Us Healthy(er)!
Paul Grosvenor, Optima Systems (U.K.)

Over the past 3 to 4, years Optima has been developing COSMOS; a tool designed to visualise data. Many of you will have seen COSMOS demonstrated in the past and may recall the way data is displayed as interlinking nodes. In this presentation Paul will discuss some of the more recent changes that have occurred to the product and how it is evolving in response to clinical need.

There are currently 800 cancer-related drugs awaiting clinical trials in the US but not enough people to trial them on. Even if there were, the identification of the right person for any particular drug is not trivial. Data is now being collected to assist in this process and we have an opportunity to make a real difference to the Clinical Study model; how do we identify and track suitable patients and how can we see what is, or is not, working in those trials?

What has come to light is that the requirements of the medical industry vary from company to company, drug to drug, and any analytical platform needs to be able to respond to those variations very fast. APL has, once again, come to the rescue and given us the ability to produce a platform that can be moulded to fit those needs quickly and easily.

However, all this does not come without its problems. As part of this talk, Paul will show the solutions to some of these problems as well as some problems that are yet to be answered...

U06: Ants, AJAX and APL
Ray Cannon, Cannon Computer Consultancy Ltd (U.K.)

Ray demonstrates "Ray Ant World", a visualisation of a match between two species of ants in a world containing two anthills, some food sources, and several obstacles, running under the rules laid out in the 2004 ICFP Programming Contest – "Dinner with Ambiants".

"Ray Ant World" is implemented in APL and utilises AJAX, JSON and JavaScript, all running through MiServer 3. APL's power is shown with a single line of code creating 20,000 lines of SVG (without a loop or "each").

U07: APL Array Notation
Phil Last, Independent APL Programmer (U.K.)

Phil explains why he thinks there's a big hole in APL notation and gives his own suggestions as to how to plug it.

U08: Data-bound Dashboard
Alexey Miroshnikov, InfoStroy Ltd (Russia)

Alexey demonstrates how a few lines of code using new features of Dyalog allow him to provide data visualisation of complex financial data by embedding the DevExpress "Dashboard" object into GAMA, InfoStroy's asset management product.

U09a: How I Won the APL Problem Solving Competition
Brian Becker, APL Tools Group Manager

The seventh annual International APL Programming Contest took place earlier this year. Brian introduces the contest and grand prize winner and presents her with her certificate in the Prize Ceremony.

U09b: How I Won the APL Problem Solving Competition
Arianna Locatelli, Liceo Classico S. M. Legnani (Italy)

Arianna Locatelli is the grand prize winner of the seventh annual International APL Programming Contest. Following the prize ceremony, Arianna will describe her experiences of Dyalog and tell us how she managed to master enough of it to win the competition.

U10: Abstract Expressionism for Parallel Performance
Robert Bernecky, Snake Island Research (Canada)

Programming with abstract, mathematical expressions offers benefits including terser programs, easier communication of algorithms, ability to prove theorems about algorithms, increased parallelism, and improved programming productivity. Common belief is that higher levels of abstraction imply a larger semantic gap between the user and computer and, therefore, typically slower execution, whether sequential or parallel. In recent years, domain-specific languages have been shown to close this gap through sophisticated optimisations benefitting from domain-specific knowledge.

In this presentation, Robert demonstrates that the semantic gap can also be closed for non-domain-specific functional array languages, without requiring embedding of language-specific semantic knowledge into the compiler tool chain. He presents a simple example of APL-style SaC programs, compiled into C-code, that outperform equivalent C programs in both sequential and parallel (OpenMP) environments.

Robert also offer insights into *abstract expressionist* programming by comparing the characteristics and performance of a numerical relaxation benchmark written in C99, C99 with OpenMP directives, scheduling code, and pragmas, and in SaC, a functional array language. He compares three algorithmic styles: if/then/else, hand-optimised loop splitting, and an abstract, functional style whose roots lie in APL. SaC algorithms are shown to match or outperform serial C, and the hand-optimised and abstract SaC styles generate identical code, and so have identical performance. Furthermore, parallel SaC variants also outperform the best OpenMP C variant by up to a third, with *no* SaC source code modifications. Preserving an algorithm's abstract expression during optimisation opens the door to generation of radically different code for different architectures.

U11: Using Co-dfns to Accelerate APL Code
Aaron Hsu, Indiana University (U.S.A.)

This live coding session will cover the expected capabilities of version 1 of the Co-dfns compiler project and demonstrate how to begin testing and experimenting with the compiler using the publicly-available pre-release versions. It will demonstrate how to take an existing APL program and integrate Co-dfns into it to best effect to assist in optimising the execution time of the code. It will also cover the currently-supported hardware platforms and give some guidance on choosing the right hardware platform to maximise performance. This session is designed to provide a practical introduction to using Co-dfns with their own code, from initial installation to final deployment of Co-dfns compiled code.

U12: Troubles with Strange Data Structures and Database Growth
Francesco Garue, APL Italiana (Italy)

Whenever software produces a number as the result of a computation, European insurance authorities require a lot of additional data to be saved so that the computation can be "reasonably" explained. If the data structure is inappropriate and/or redundant, then database growth can spiral out of

control. Some of APL Italiana's customers began claiming that the volume of additional data was growing by an order of magnitude faster than the rest of the database and their disks were filling up, so something needed to be done – Francesco explains what was done both to change a particular data structure without re-writing the whole code base and to compress the data (no DCF file compression was available at that time).

U13: TamStat, a Statistical Package
Steve Mansour, The Carlisle Group and University of Scranton (U.S.A.) & Jerry Brennan, Jerry M Brennan PhD Inc (U.S.A.)

TamStat is a statistical package written in Dyalog. What distinguishes it from other statistical programs such as R, Minitab and Excel are its natural use of arrays, operators and namespaces. While users have the option of using the APL character set, there are ASCII cover functions that allow them to use a traditional keyboard if they so desire. There is also an option to call R to do some calculations using the RConnect workspace. Recent developments include a function to import data from Excel, a Reference Card, a User Guide and a web interface using MiServer. The MiServer interface includes plotting routines, tabbed interactive tutorials and videos for learning statistics, using TamStat and programming in APL.

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Practical Information

To make your stay as pleasant as possible, we would like to draw your attention to some practical details.

Check In and Out
Your room is available from **15:00** on the day of arrival; you will need to check out of the room by **10:00** on the day of departure.

Internet Access
Free WiFi is available in all the common areas and meeting rooms. The WiFi network is *NaxosBeach* – you will need to open your browser and create an account to connect. There are PCs with internet access and printers in the reception area but their use may be charged.

Meals and Drinks
The user meeting fee includes all meals and breaks on user meeting days.
- The Lunch buffet includes ¼ bottle of wine and water.
- Dinner includes ¼ bottle of wine and water.
- Wine is included in the Banquet Dinner.
- Guest rooms DO NOT have tea/coffee making facilities.

A number of bars around the hotel sell drinks and snacks. They do not accept cash, only the Naxos Card (the Naxos Card is your room key). Your Naxos Card can be loaded with cash at several places in the hotel. Any funds remaining on the card will be refunded on checkout. This card also grants you access to the restaurants for breakfast/dinner.

Hotel Facilities
The fitness centre and outdoor pools can be used free of charge. Tennis courts, a short football pitch, a billiards room and many other sporting activities are also available (see http://www.atahotels.it/en/naxos/attivita for full list). The hotel has an on-site beauty centre – ask at reception for details of treatments and charges. The hotel reception staff can supply information about local activities and things to do in the area and there is an on-site tourist office for booking excursions, etc.

There is a very good 'tourist' shop on site that is a newsagent and tobacconist and sells gifts, sun products, swimwear, clothing and activity wear. The main reception area includes a cash machine.

Smoking Policy
Smoking is not allowed inside the main buildings or guest rooms.