

# GETTING STARTED ON ARCHER

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ARCHER Champions

5<sup>th</sup> / 6<sup>th</sup> SEPTEMBER 2016 – University of Oxford

*Clair Barrass, USL Team and Training Administrator*



# Getting Started on ARCHER

Access



Training





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- Getting Access
- TA Form and Notes
- kAU Calculator
- Cost of Access

Getting Access to ARCHER

## Getting Access to ARCHER

There are specific allocation mechanisms for requesting ARCHER time via the ARCHER partner research councils EPSRC and NERC as detailed below. For researchers in other areas, please get in touch with your research council if you would like to use ARCHER.

### Simple Access Mechanisms for New Users

- [Access Through the EPSRC/NERC Scientific Consortia](#) - Time for projects within consortia remits. Often the simplest method of getting access if your research is in the remit of one of the consortia.
- [Access through the ARCHER Driving Test](#) - Small amount of time for new users and communities who would not otherwise be able to gain initial experience on HPC systems.

### Open ARCHER Calls

A list of any currently open calls through which you can apply for access to ARCHER.


Note: access via standard grant applications is always open via standard research council routes and is not listed in this table. Please see below for more information on these routes.

Call (Web Link)	Closing Date	TA Receipt Deadline	Notes	TA Form Link
<a href="#">Instant Access</a>	Always Open	Always Open	EPSRC Remit only, 1,200 kAU (80,000 CPUh) maximum, 6 months maximum	<a href="#">Instant Access TA Form</a>

**Contact Us**

support@archer.ac.uk

**Tweets by @ARCHER\_HPC**

 ARCHER HPC S...  
@ARCHER\_HPC

New user mailing [ARCHER] RDF DAC returned to service, Fri 26 Aug 2016: [edin.ac/2bkQktS](#) (SAFE login required)

26 Aug



# Access

Lots of information on ARCHER Website

- EPSRC
  - RAP
  - Leadership
  - EPSRC Grant
  - Instant Access
  - **ARCHER Driving Test**
- NERC
  - NERC Grant
- Other
  - Grants or other funding mechanisms



# Access Details

- EPSRC / NERC Consortia
  - Projects which fall within the remit of the existing consortia
  - Each consortium has its own way of applying for access and allocating time.
  - Details on the ARCHER Scientific Consortia webpage  
<http://www.archer.ac.uk/community/consortia/>



# Access Details

- RAP (Resource Allocation Panel)
  - 2 calls per year
  - No limit on amount of time that can be requested
  - Access to ARCHER for one year
  - Top-up available for up to two years
- Leadership Project
  - 1 call per year
  - Computationally intensive projects >100,000 kAU
  - Up to 24 months



# Access Details

- Grants – from EPSRC / NERC / Other
  - Grant application details and forms available on website
  - Up to three years funding
  - Generally require Technical Assessment to be submitted with the application
- Instant Access
  - Aimed at new ARCHER users
  - Up to 1200 kAUs
  - Up to 6 months
  - Opportunity to test ARCHER for their purposes
  - Prepare for fully peer reviewed application



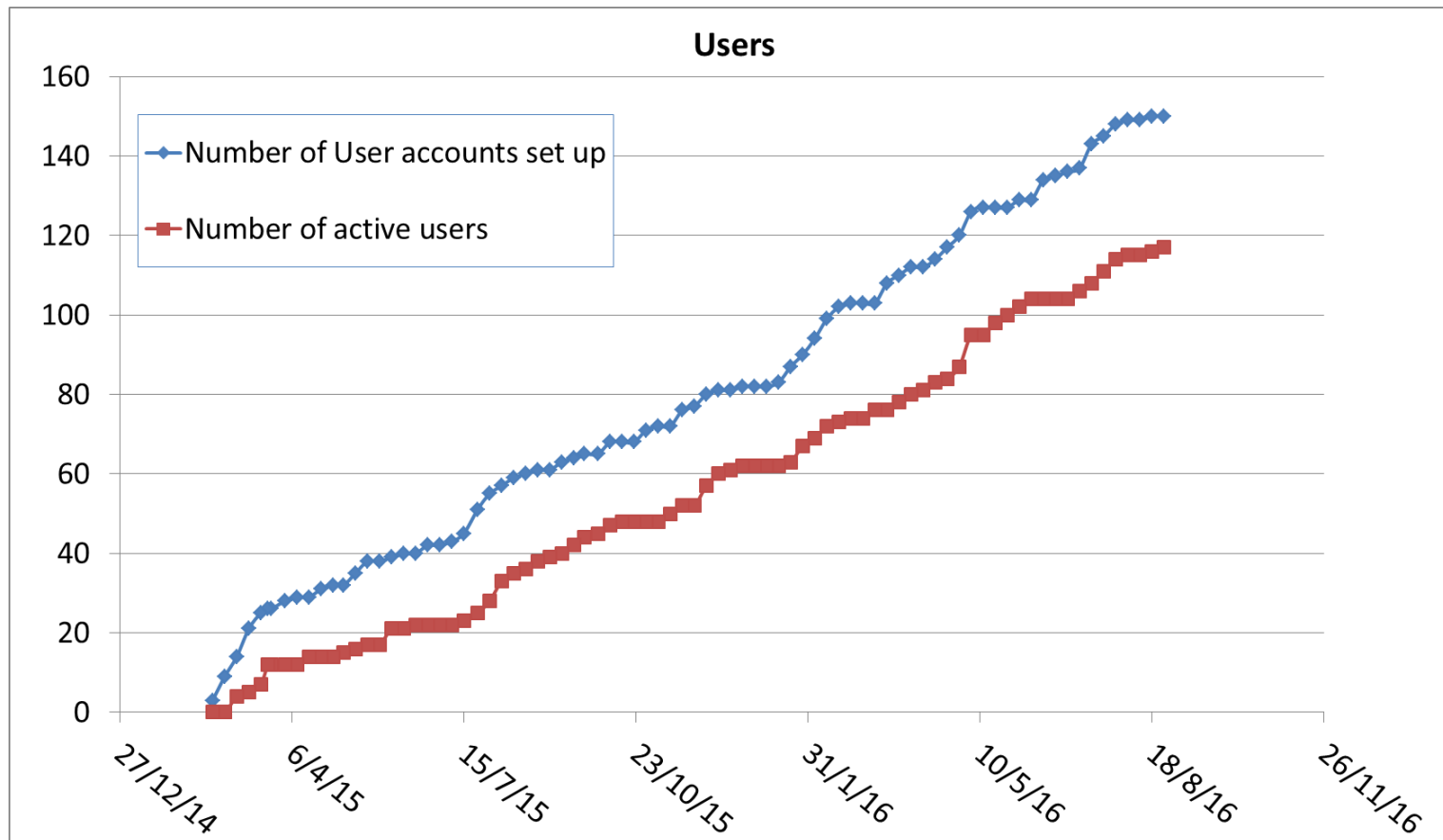
# ARCHER Driving Test

- Introduced at beginning of 2015
- Very low barrier-to-entry
  - Online Quiz
- Instant access
  - Invitation issued right away
- Sufficient time and resources to get started
  - 1200 kAUs for 12 months
- Full ARCHER support team available right away

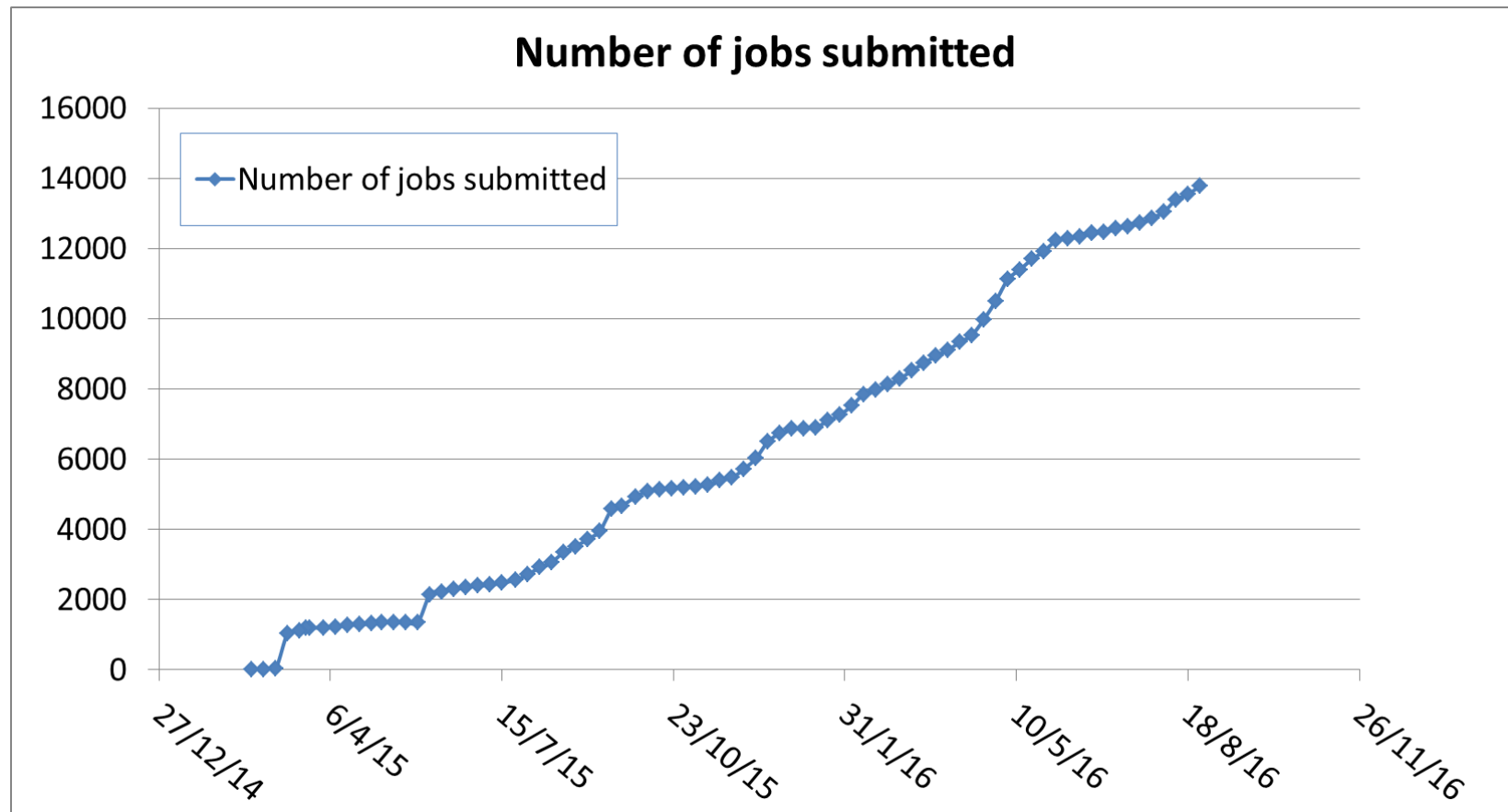




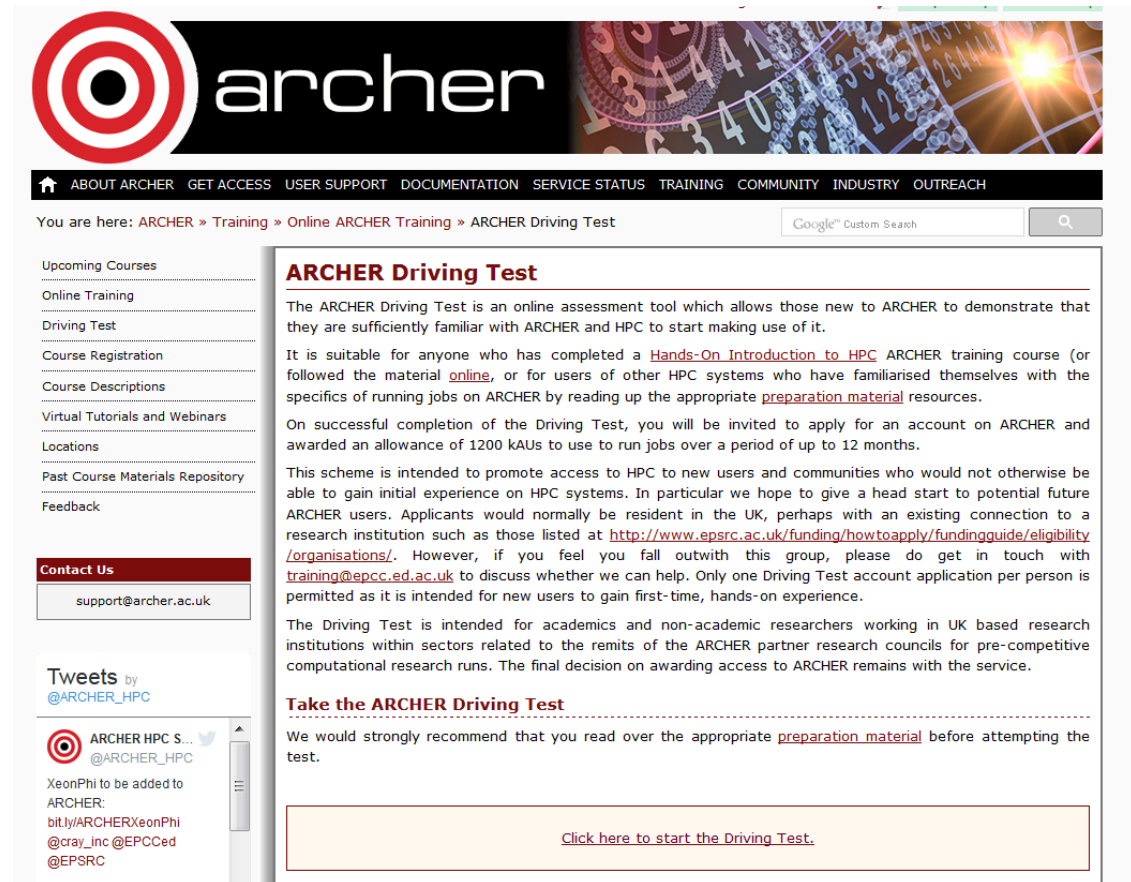
# ARCHER Driving Test




# ARCHER Driving Test



# ARCHER Driving Test



 archer

ABOUT ARCHER GET ACCESS USER SUPPORT DOCUMENTATION SERVICE STATUS TRAINING COMMUNITY INDUSTRY OUTREACH

You are here: ARCHER » Training » Online ARCHER Training » ARCHER Driving Test

Google™ Custom Search

**ARCHER Driving Test**

The ARCHER Driving Test is an online assessment tool which allows those new to ARCHER to demonstrate that they are sufficiently familiar with ARCHER and HPC to start making use of it.

It is suitable for anyone who has completed a [Hands-On Introduction to HPC](#) ARCHER training course (or followed the material [online](#), or for users of other HPC systems who have familiarised themselves with the specifics of running jobs on ARCHER by reading up the appropriate [preparation material](#) resources.

On successful completion of the Driving Test, you will be invited to apply for an account on ARCHER and awarded an allowance of 1200 kAUs to use to run jobs over a period of up to 12 months.

This scheme is intended to promote access to HPC to new users and communities who would not otherwise be able to gain initial experience on HPC systems. In particular we hope to give a head start to potential future ARCHER users. Applicants would normally be resident in the UK, perhaps with an existing connection to a research institution such as those listed at <http://www.epsrc.ac.uk/funding/howtoapply/fundingguide/eligibility/organisations/>. However, if you feel you fall outwith this group, please do get in touch with [training@epcc.ed.ac.uk](mailto:training@epcc.ed.ac.uk) to discuss whether we can help. Only one Driving Test account application per person is permitted as it is intended for new users to gain first-time, hands-on experience.

The Driving Test is intended for academics and non-academic researchers working in UK based research institutions within sectors related to the remit of the ARCHER partner research councils for pre-competitive computational research runs. The final decision on awarding access to ARCHER remains with the service.

**Take the ARCHER Driving Test**

We would strongly recommend that you read over the appropriate [preparation material](#) before attempting the test.

[Click here to start the Driving Test.](#)


**Upcoming Courses**

- Online Training
- Driving Test
- Course Registration
- Course Descriptions
- Virtual Tutorials and Webinars
- Locations
- Past Course Materials Repository
- Feedback

**Contact Us**

[support@archer.ac.uk](mailto:support@archer.ac.uk)

**Tweets by @ARCHER\_HPC**

 XeonPhi to be added to ARCHER: [bit.ly/ARCHERXeonPhi](http://bit.ly/ARCHERXeonPhi) @cray\_inc @EPCCed @EPSRC



# Driving Test – Question Bank

- Range of question topics
  - Compiling
  - Hardware
  - Input / Output / Data management
  - PBS job submission
  - Running jobs
  - Programming
- 64 different questions - and growing



# Driving Test – Question Bank

Each quiz contains 20 questions

Randomly selected <i>2 questions will be randomly selected from label: <a href="#">ARCHER</a>, <a href="#">Hardware</a>.</i>
Randomly selected <i>3 questions will be randomly selected from label: <a href="#">ARCHER</a>, <a href="#">I / O</a>.</i>
Randomly selected <i>4 questions will be randomly selected from label: <a href="#">ARCHER</a>, <a href="#">Programming</a>.</i>
Randomly selected <i>3 questions will be randomly selected from label: <a href="#">ARCHER</a>, <a href="#">Compiling</a>.</i>
Randomly selected <i>1 question will be randomly selected from label: <a href="#">ARCHER</a>, <a href="#">PBS</a>.</i>
Randomly selected <i>3 questions will be randomly selected from label: <a href="#">ARCHER</a>, <a href="#">Running jobs</a>.</i>
Randomly selected <i>4 questions will be randomly selected from label: <a href="#">ARCHER</a>, <a href="#">Final</a>.</i>



# ARCHER Driving Test Questions

5. Jobs on ARCHER should be run from within which filesystem?

- /PBS
- /home
- /work
- /general



# ARCHER Driving Test Questions

16. You have just logged in to ARCHER and you wish to run a parallel application. However, your application builds with gnu or intel compilers only; how should you ensure that the source code is compiled correctly?

(select all the ones that apply) (1 point)

- use the module command to change the default programming environment
- alter the makefile so that the gnu or intel compiler is called explicitly
- alter the makefile so that it uses the generic compiler wrappers (cc, CC or ftn)
- compile on a local Linux system which has these compilers and copy the executable to ARCHER



# ARCHER Driving Test Questions

57. Which of the following is the best definition of "decomposition" when thinking about parallelising a problem? (1 point)

- The proportion by which the processing speed is increased by splitting up the problem
- The impact of the increased communication required on the total run time when the problem is split up
- The decision on how to split the problem up into many tasks
- The time taken to run the parts of the process which cannot be split up





# ARCHER Driving Test Certificate & Sign-up Invitation

## ARCHER Driving Test

Training <Training@staffmail.ed.ac.uk>

Sent: Thu 01/09/2016 08:44

To: 'k.s.curtis@leeds.ac.uk'

Message: Driving Test Certificate Kellye Coffyn.pdf (225 KB)

Dear Kellye

Congratulations on successfully completing the ARCHER Driving Test - your Certificate of Completion is attached.

We are pleased to confirm that you have passed the test and would like to invite you to apply for an account on ARCHER including 1200 KAU's which can be used over the coming 12 months to put the skills you have learned into practice.

This time on ARCHER can be used for any academic research, or for pre-competitive computational research runs for non-academic researchers within sectors related to the remits of the ARCHER partner research councils. \* \* \* This is a once-only offer, only one application for time on ARCHER may be made under this scheme, per person. \* \* \*

In order to set up your account, you must first register on our administration system, SAFE. Full instructions are available at <http://www.archer.ac.uk/documentation/safe-guide/safe-guide-users.php#reg-log-pass>

Once you have an account on SAFE, you should apply for your ARCHER machine account under project e508 ARCHER Driving Test. Full instructions on this step are available at <http://www.archer.ac.uk/documentation/safe-guide/safe-guide-users.php#getac>. The project sign up password is 'driving'. Please do not share these sign up details with anyone else.

There is lots of information, a Quick Start guide and ARCHER User guide at <http://www.archer.ac.uk/documentation/>

If you have any questions about this offer or about the ARCHER Driving test, please contact [training@epcc.ed.ac.uk](mailto:training@epcc.ed.ac.uk). Any questions relating to using ARCHER should be sent to [helpdesk@archer.ac.uk](mailto:helpdesk@archer.ac.uk)

We look forward to receiving your application and welcoming you to the ARCHER User Community.

Best wishes

Clair  
EPCC Training Team



## *Certificate of Completion*

This certificate is awarded to

*To Bloggs*

*1 April 2015*

for successfully passing the

## **ARCHER Driving Test**

ARCHER is the UK National Supercomputing Service,

a Cray XC30 system with over a hundred thousand processor-cores.

The ARCHER Driving Test is an on-line assessment tool which allows those new to

ARCHER to demonstrate that they are sufficiently familiar with ARCHER and

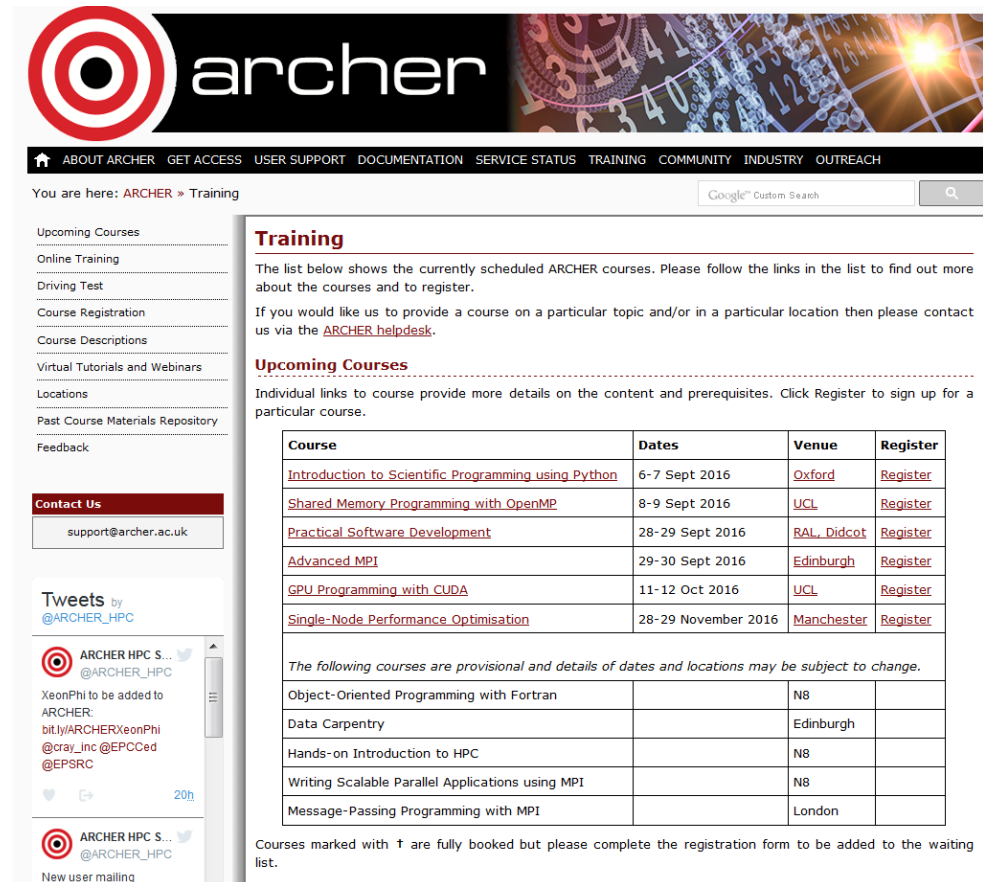
High Performance Computing to start making use of it.



Once you have access – now what?



# Training



The screenshot shows the ARCHER website's Training page. At the top is the ARCHER logo (a red bullseye) and the word 'archer' in white on a black background. Below the logo is a navigation menu with links: ABOUT ARCHER, GET ACCESS, USER SUPPORT, DOCUMENTATION, SERVICE STATUS, TRAINING, COMMUNITY, INDUSTRY, and OUTREACH. The page title is 'You are here: ARCHER » Training'. A search bar is visible on the right. On the left side, there is a sidebar with links: Upcoming Courses, Online Training, Driving Test, Course Registration, Course Descriptions, Virtual Tutorials and Webinars, Locations, Past Course Materials Repository, and Feedback. Below the sidebar is a 'Contact Us' section with the email support@archer.ac.uk and a 'Tweets by @ARCHER\_HPC' section showing two tweets from ARCHER HPC S... @ARCHER\_HPC. The main content area is titled 'Training' and contains the following text: 'The list below shows the currently scheduled ARCHER courses. Please follow the links in the list to find out more about the courses and to register. If you would like us to provide a course on a particular topic and/or in a particular location then please contact us via the ARCHER helpdesk.' Below this is a section titled 'Upcoming Courses' with the text: 'Individual links to course provide more details on the content and prerequisites. Click Register to sign up for a particular course.' A table follows, listing courses with columns for Course, Dates, Venue, and Register. The table contains six rows of data. Below the table is a note: 'The following courses are provisional and details of dates and locations may be subject to change.' This is followed by another table with five rows of data. At the bottom of the page, there is a note: 'Courses marked with † are fully booked but please complete the registration form to be added to the waiting list.'

**Training**

The list below shows the currently scheduled ARCHER courses. Please follow the links in the list to find out more about the courses and to register.

If you would like us to provide a course on a particular topic and/or in a particular location then please contact us via the [ARCHER helpdesk](#).

**Upcoming Courses**

Individual links to course provide more details on the content and prerequisites. Click Register to sign up for a particular course.

Course	Dates	Venue	Register
<a href="#">Introduction to Scientific Programming using Python</a>	6-7 Sept 2016	<a href="#">Oxford</a>	<a href="#">Register</a>
<a href="#">Shared Memory Programming with OpenMP</a>	8-9 Sept 2016	<a href="#">UCL</a>	<a href="#">Register</a>
<a href="#">Practical Software Development</a>	28-29 Sept 2016	<a href="#">RAL, Didcot</a>	<a href="#">Register</a>
<a href="#">Advanced MPI</a>	29-30 Sept 2016	<a href="#">Edinburgh</a>	<a href="#">Register</a>
<a href="#">GPU Programming with CUDA</a>	11-12 Oct 2016	<a href="#">UCL</a>	<a href="#">Register</a>
<a href="#">Single-Node Performance Optimisation</a>	28-29 November 2016	<a href="#">Manchester</a>	<a href="#">Register</a>

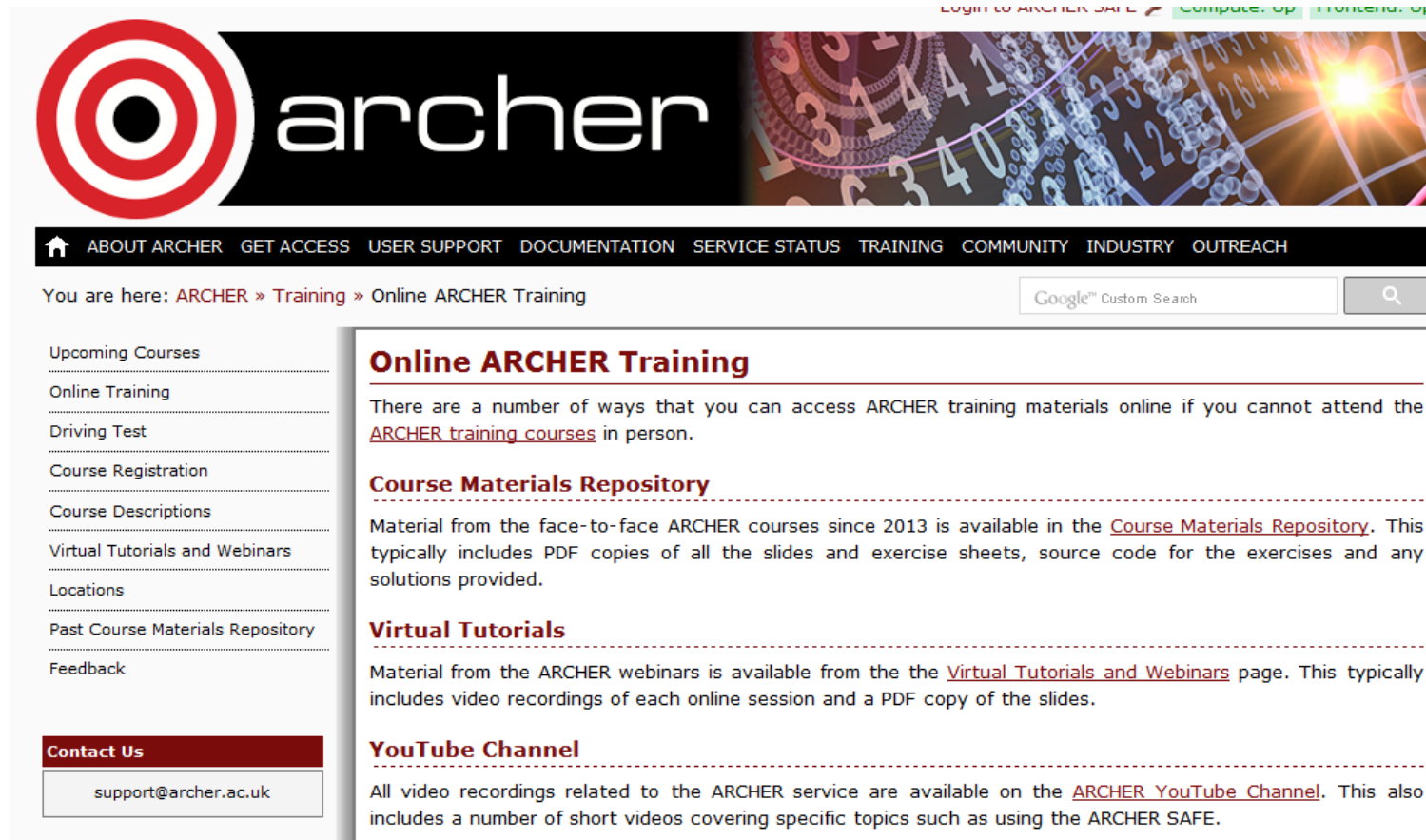
*The following courses are provisional and details of dates and locations may be subject to change.*

Object-Oriented Programming with Fortran		N8	
Data Carpentry		Edinburgh	
Hands-on Introduction to HPC		N8	
Writing Scalable Parallel Applications using MPI		N8	
Message-Passing Programming with MPI		London	


Courses marked with † are fully booked but please complete the registration form to be added to the waiting list.



# Online Training



Login to ARCHER SAFE [Compute Up](#) [Train Up](#)



Home ABOUT ARCHER GET ACCESS USER SUPPORT DOCUMENTATION SERVICE STATUS TRAINING COMMUNITY INDUSTRY OUTREACH

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**Contact Us**  
support@archer.ac.uk

## Online ARCHER Training

There are a number of ways that you can access ARCHER training materials online if you cannot attend the [ARCHER training courses](#) in person.

### Course Materials Repository

Material from the face-to-face ARCHER courses since 2013 is available in the [Course Materials Repository](#). This typically includes PDF copies of all the slides and exercise sheets, source code for the exercises and any solutions provided.

### Virtual Tutorials

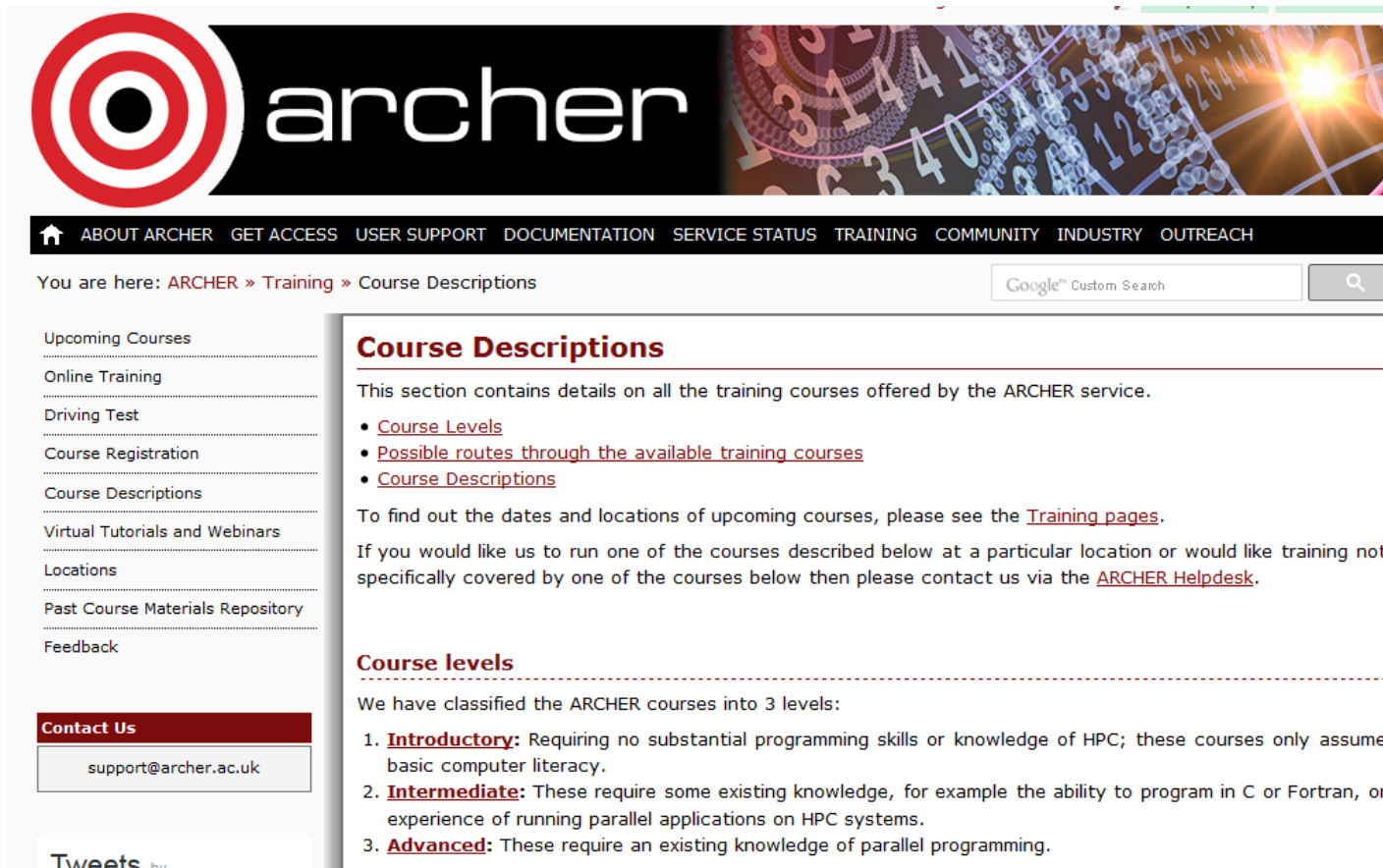
Material from the ARCHER webinars is available from the the [Virtual Tutorials and Webinars](#) page. This typically includes video recordings of each online session and a PDF copy of the slides.

### YouTube Channel

All video recordings related to the ARCHER service are available on the [ARCHER YouTube Channel](#). This also includes a number of short videos covering specific topics such as using the ARCHER SAFE.



# Training Course Descriptions



The screenshot shows the ARCHER website's "Training Course Descriptions" page. The header features the ARCHER logo (a red target icon) and the word "archer" in white lowercase letters on a black background. Below the header is a navigation menu with links: ABOUT ARCHER, GET ACCESS, USER SUPPORT, DOCUMENTATION, SERVICE STATUS, TRAINING, COMMUNITY, INDUSTRY, and OUTREACH. The breadcrumb trail reads "You are here: ARCHER » Training » Course Descriptions". A search bar with "Google™ Custom Search" is visible. The left sidebar contains a list of navigation links: Upcoming Courses, Online Training, Driving Test, Course Registration, Course Descriptions (highlighted), Virtual Tutorials and Webinars, Locations, Past Course Materials Repository, and Feedback. Below the sidebar is a "Contact Us" button with the email address "support@archer.ac.uk" and a "Tweets" widget. The main content area is titled "Course Descriptions" and contains the following text:

This section contains details on all the training courses offered by the ARCHER service.

- [Course Levels](#)
- [Possible routes through the available training courses](#)
- [Course Descriptions](#)

To find out the dates and locations of upcoming courses, please see the [Training pages](#).

If you would like us to run one of the courses described below at a particular location or would like training not specifically covered by one of the courses below then please contact us via the [ARCHER Helpdesk](#).

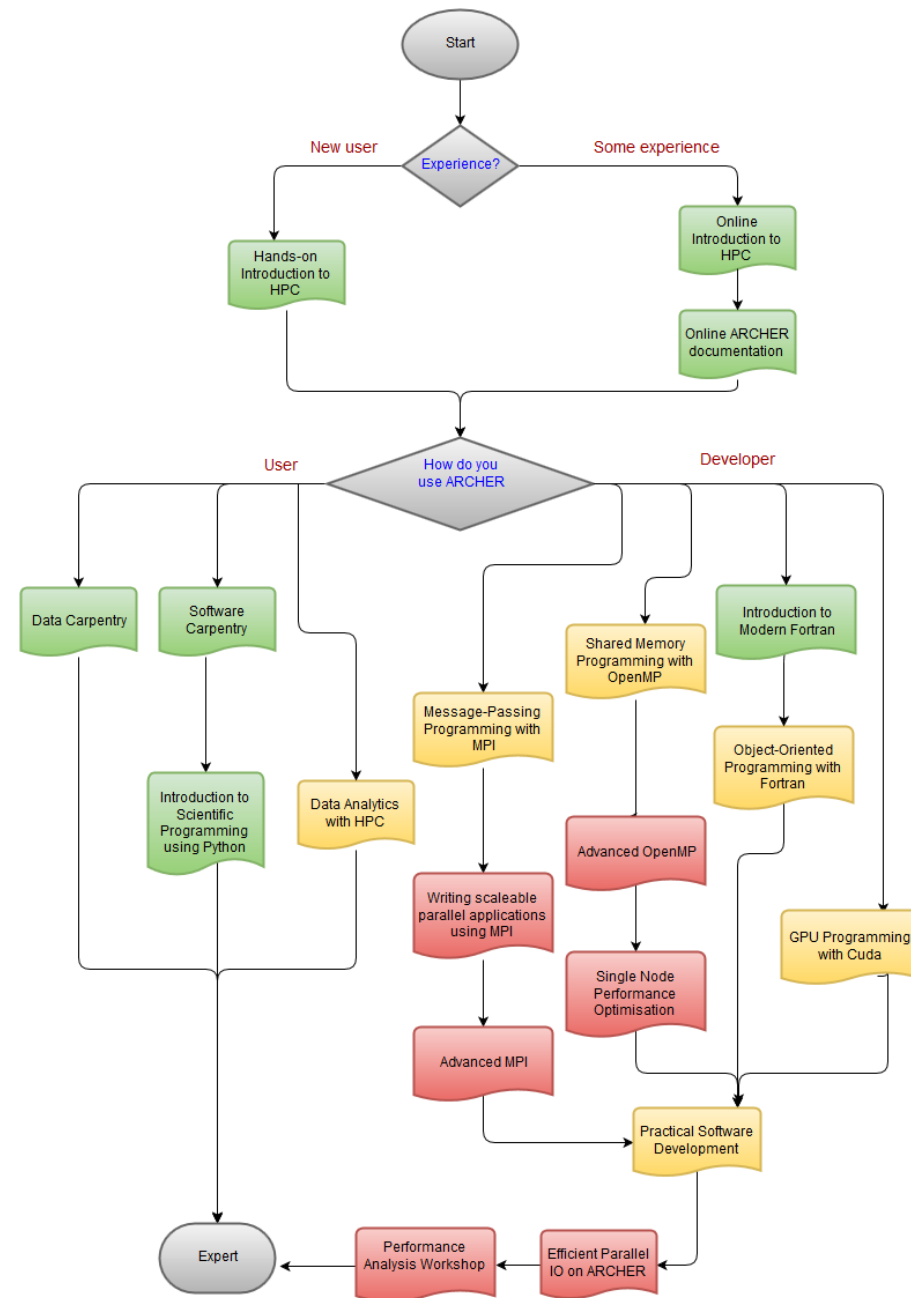
**Course levels**

We have classified the ARCHER courses into 3 levels:

1. **Introductory:** Requiring no substantial programming skills or knowledge of HPC; these courses only assume basic computer literacy.
2. **Intermediate:** These require some existing knowledge, for example the ability to program in C or Fortran, or experience of running parallel applications on HPC systems.
3. **Advanced:** These require an existing knowledge of parallel programming.

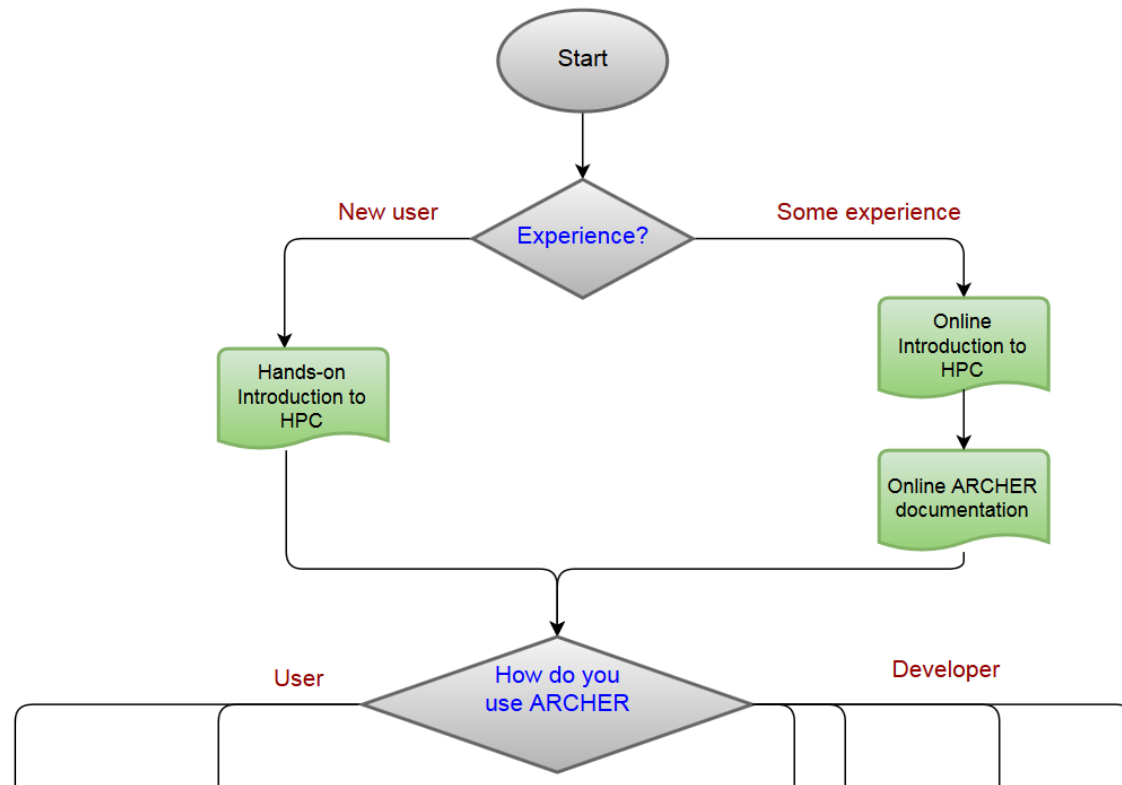


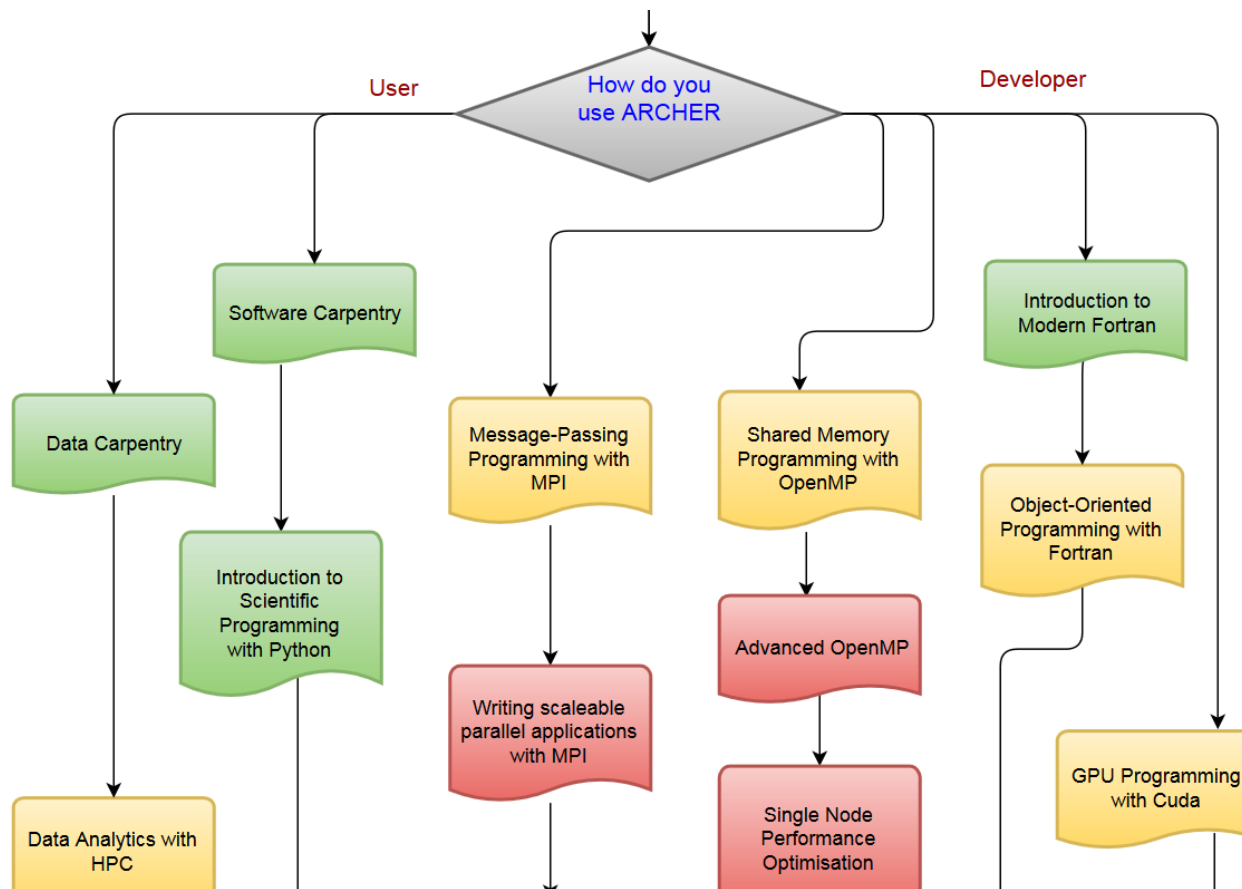
# Training Course Flowchart



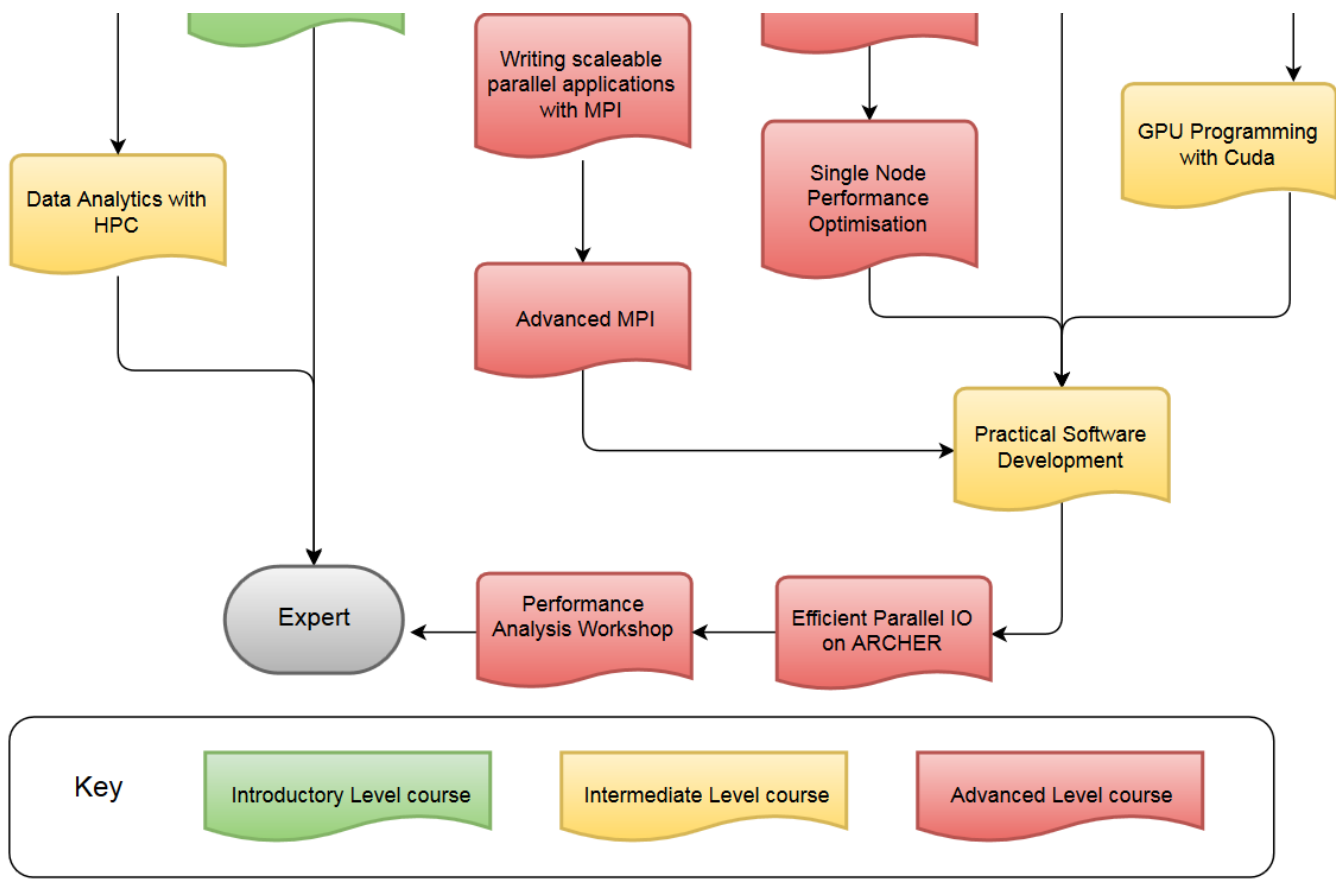
# Training Course Flowchart

Possible routes through the available training courses









# Course Descriptions

## **Outline Course Descriptions**

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### **Introductory (level 1) courses**

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#### **Data Carpentry**

In many domains of research, the rapid generation of large amounts of data is fundamentally changing how research is done. The deluge of data presents great opportunities, but also many challenges in managing, analysing and sharing data. Data Carpentry aims to teach the skills that will enable researchers to be more effective and productive. The course is designed for learners with little to no prior knowledge of programming, shell scripting, or command line tools.

#### **Hands-on Introduction to High Performance Computing**



High-performance computing (HPC) is a fundamental technology used in solving scientific problems. Many of the grand challenges of science depend on simulations and models run on HPC facilities to make progress, for example: protein folding, the search for the Higgs boson and developing nuclear fusion.

The course runs for 2 days. The first day covers the the basic concepts underlying the drivers for HPC development, HPC hardware, software, programming models and applications. The second day will provide an opportunity for more practical experience, information on performance and the future of HPC. This foundation will give the you ability to appreciate the relevance of HPC in your field and also equip you with the tools to start making effective use of HPC facilities yourself.

The course is delivered using a mixture of lectures and hands-on sessions and has a very practical focus. During the hands-on sessions you will get the chance to use ARCHER with HPC experts available to answer your questions and provide insight.



# Course Materials Repository



Home ABOUT ARCHER GET ACCESS USER SUPPORT DOCUMENTATION SERVICE STATUS TRAINING COMMUNITY INDUSTRY OUTREACH

You are here: ARCHER » Training » Training

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Course Descriptions  
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Feedback

**Contact Us**  
support@archer.ac.uk

Tweets by

## Training

The list below shows past ARCHER courses. Please follow the links in the list to find out more about each course.

### Past courses

#### 2016

<a href="#">Advanced OpenMP</a>	2-4 August 2016	<a href="#">Bristol</a>	<a href="#">Course materials</a>
<b>ARCHER Summer School 2016</b>			
• <a href="#">Hands-On Introduction to HPC</a>	11-12 July 2016	<a href="#">EPCC, Edinburgh</a>	<a href="#">Course Materials</a>
• <a href="#">Message-passing Programming with MPI</a>	13-15 July 2016	<a href="#">EPCC, Edinburgh</a>	<a href="#">Course Materials</a>
<a href="#">Performance Analysis workshop</a>	6-8 July 2016	<a href="#">Cambridge</a>	<a href="#">Course page</a>



# All Course Resources Remain Available

## Shared-Memory Programming with OpenMP

**Dates:** 11-12 May 2016

**Location:** University of Sheffield

### Lecture Slides

#### Wednesday 11th May 2016

- [Overview of ARCHER training](#)
- [Shared-memory concepts](#)
- [Parallel traffic modelling](#)
- [Traffic modelling solution](#)
- [OpenMP introduction](#)
- [Parallel regions](#)
- [Work sharing directives](#)

#### Thursday 12th May 2016

To follow

- [Synchronisation](#)
- [Further topics](#)
- [Tasks](#)
- [OpenMP memory model](#)
- [Caches](#)
- [Cache coherency](#)
- [Non-Uniform Memory Access](#)
- [Performance tuning](#)

### Notes

Short summaries of the OpenMP syntax are available from the OpenMP website:

- [OpenMP 4.0 API C/C++ Syntax Quick Reference Card](#)
- [OpenMP 4.0 API Fortran Syntax Quick Reference Card](#)

### Exercise Material

- [Traffic modelling exercise sheet](#)
- [OpenMP exercise sheet](#)
- [OpenMP source code](#)
- [Performance investigations](#)



# Website Documentation

- Using ARCHER

The screenshot shows the ARCHER website's documentation page. The header features the ARCHER logo and a navigation menu with 'DOCUMENTATION' highlighted. The breadcrumb trail reads 'You are here: ARCHER » Documentation'. A left sidebar lists various guides, with 'ARCHER User Guide' selected. A right sidebar menu is open, showing 'ARCHER User Guide' as the active selection. The main content area displays the 'ARCHER User Guide' title and introductory text.



- Using SAFE


The screenshot shows the ARCHER website's documentation page for SAFE. The header features the ARCHER logo and a navigation menu with 'DOCUMENTATION' highlighted. The breadcrumb trail reads 'You are here: ARCHER » Documentation » SAFE version 4'. A left sidebar lists various guides, with 'SAFE User Guide' selected. A right sidebar menu is open, showing 'SAFE User Guide' as the active selection. The main content area displays the 'SAFE version 4 User Guide' title and introductory text, including a list of topics like 'Registering, logging in, passwords' and 'User Mailing Options'.

# Documentation – Screencast Videos

## **Registering, logging in, passwords**


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### **How to register on SAFE**


1. Go to the SAFE [New User Signup Form](#) 
2. Fill in your personal details. You can come back later and change them if you wish
3. Click "Submit"
4. You are now registered. Your SAFE password will be emailed to the email address you provided. You can then login with that email address and password

At this point your account is registered on the SAFE but you do not have a machine account for ARCHER. To obtain a machine account on ARCHER you require a *Project Code* and a *Project Password* (if required). Your project's PI or Project Manager should be able to supply you with these details.

Once you have them you should:

1. Log into SAFE 
2. On the Main page, click the "Request New Account" button.
3. Select the correct project from the drop down list
4. Enter the correct project password for the project you have selected.

### **How to login to SAFE and Overview of Main Page**

1. Go to the SAFE <https://www.archer.ac.uk/safe/> 
2. Type in the email address you have registered with
3. Type in your SAFE password
4. Click "Login"
5. You are now on the Main Page and here you can see Menus along the top which give access to SAFE functionality



# Key to Success

- New users up and running
- Experienced users mastering new skills
- Successful research





EPSRC

NERC SCIENCE OF THE ENVIRONMENT

CRAY  
THE SUPERCOMPUTER COMPANY

epcc



<http://www.archer.ac.uk>  
[support@archer.ac.uk](mailto:support@archer.ac.uk)

