

# Open Source is...



### Modifiable code



# A message from the Edu

Python is a human readable programming language and in this lesson, you get to move from using the block code of MakeCode, to writing in the human readable source code language Python. Wow - you are really on your journey to becoming software developers!

Why not be inspired by Guido van Rossum, the Dutch programmer who created Python, and who is our hero for this ezine?

It's a big step moving to Python, and you will find we use this in many of the lessons of the second course. Congratulations on making that step.

Our friends at the Open Data Institute are sharing information on data through the ezines. In lesson 3, they start to explain data infrastructure. This is an important part of our "digital infrastructure" which brings together data and software to build the apps, and the systems our daily lives depend on.

You will learn more about these as the course progresses, so don't worry if some of this takes a little longer to understand. By the end of our 10 lessons, you will be an expert on digital! That will be really helpful as our futures will all be digital and, whatever you do in life, it will be a great thing to understand.



**Amanda** CEO, OpenUK

## Ask Ashleigh



#### **Belonging - Acceptance**

At OpenUK, we want to inspire confidence and motivation. Our message is that everyone and anyone can belong to the Open Technology community.

This reaches the systemic root of digital exclusion (not allowing everyone to be a part of the digital world) and aims to fulfil our purpose of not only developing UK Leadership in Open Technology as we collaborate globally. We want to do that in a sustainable way.

We are people, not labels. This means that we must remember that regardless of ethnicity, gender, religion, creed, colour, age, neuro divergence, socioeconomic status, origin, or sexual orientation we are all people. Everyone, each of us, should have the opportunity to succeed and feel "a sense of belonging".

We choose the term "belonging" as it represents acceptance and security for each of us. It focuses on people and everyone's innate need to belong. To make everyone feel like this we all need to pay attention, not to individual groups or certain agendas, but to recognise the vital need to accept everyone.



## Sustainability



#### Sustainability: Prosperity versus Growth

We previously discussed how the preferred current economic model is focused on perpetual growth, and how this creates increased inequality between people, while at the same time rapidly destroying the limited natural resources of our planet. So how do we fix that?

Economist Kate Raworth came up with a wonderful way to start thinking about that. Imagine you're holding a doughnut. A round, sweet, and tasty piece of dough, with a hole in the middle. Now imagine that as long as people and our natural resources were all residing on the dough, that would be the "sweet spot" for humanity - in which everyone is treated equally, and receives what they need to live well in terms of access to housing, health, food, income, education, and work opportunities. All while always ensuring that the natural resources used do not run out, or get ruined by pollution and waste. That is prosperity, and for prosperity to work, we have to make sure that no person falls through the hole in the middle, and that the use of our planet's natural resources doesn't exceed the outer edge of the doughnut.

So, to solve the problem, we need to start by considering a change in the goals of governments and businesses: moving from GDP and profit growth to prosperity for all people and the planet.

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We all have a role to play in making this prosperity happen. From who we vote for in government elections, to the brands we choose to buy from, from the companies we choose to work for or create, to what we consume and how much across food, energy, travel, fashion, and reducing our waste or when that's not possible, recycling it. All of this will have an impact.

Our individual choices are super important, even if it doesn't always feel like it.

#### **Keep Coding!**

**Christian** Chief Sustainability Officer, OpenUK

## **Please Miss Boal**



The journey to being coders takes another step in this episode, as you begin typing code Python, a coding language written in English and one of the coding languages called a high-level language. This can be challenging because of syntax. Programers talk about syntax and this is the way that you type code. Syntax errors are one of the main issues that all programers face so remember the famous words of Orlando A. Batissa "an error doesn't become a mistake until you refuse to fix it."

Computers can only run programs written in machine code, so programs written in a high-level languages have to be translated into machine code before they can be run. Two kinds of programs translate high-level languages into low-level languages –interpreters and compilers.

An interpreter reads a high-level program and executes it, meaning that it does what the program says. It translates the program a little at a time, alternately reading lines and performing computations.

A compiler reads the program and translates it completely before the program starts running. In this context, the high-level program is called the source code, and the translated program is called the object code or the executable. Once a program is compiled, you can execute it repeatedly without more translation.

Python is considered an interpreted language because Python programs are executed by an Interpreter. Challenge yourself to alter the Python program in this lesson and correct the errors that you make.

#### Keep Coding!

Pan Computer Science Lead, OpenUK



Pamela Boal

## Open Source Hero



#### **Getting inspired**

I am a late bloomer, a Dutch man graduated from College aged 26. As you hear in the OpenUK Kids Camp lesson 4, I am the creator of the Python coding language. And it's fairly popular. You also know how it got its name.

Like many of you doing this course, began when I was young, only 10. My parents gave me an educational electronics kit made by Philips. It was amazing.

At first I just followed the directions and everything worked; later I figured out how to design my own circuits. My prized possessions were the kit's three (!) transistors. I took one of my first electronics models, a blinking light, to show and tell in 5th grade. I know your gloves work with a micro:bit two to give you lights like this.

I used to sit at the back of the physics class with my nerd friends discussing NAND gates while the rest of the class was still figuring out Ohm's law.

But our physics teacher was a step ahead and he had he employed us to build a digital timer that he used to demonstrate the law of gravity to the rest of the class. It showed us that our skills were useful. I graduated as one of the best students of my year and am grateful to my inspiring teacher.



Python is a friendly programming language for beginners because it has easy to read syntax and lots of freely available resources for those interested in learning more about it! It is an open source programming language that has a global community.

Open source software promotes collaboration and sharing, which has helped us grow our community over the years! The Python Software Foundation (PSF) is the non-profit behind Python and its community.

The PSF oversees the legal needs by managing the open source licensing and protecting the trademarks associated with Python. The PSF also runs the PyCon US conference annually, supports other Python conferences around the world, and funds Python related development with our grants program.

This year (2021) the PSF is taking on additional community support by hiring two additional full-time employees to support the core code behind Python and also packaging.

You can learn more about the Python Foundation at https://www.python.org/psf-landing/

Keep coding!



## **Open Data**

#### What is data infrastructure?

What would we do without trains? Without bridges? Without power lines? We call this 'physical infrastructure' – things around us that enable us to go about our daily lives. Physical infrastructure is usually something we can see and touch, but there's a hidden type of infrastructure that's just as important – data infrastructure.

How do you know when your train is coming? Or when a bridge was last repaired? How do we know where our power comes from and how much it costs?

Data provides the information we need to live our daily lives, and it's just as essential to maintain data as it is to maintain our railway lines, bridges, or power networks.

Data infrastructure doesn't just exist about physical infrastructure, or in the villages, towns, and cities that we live in. It exists all across the world. For example, climate change and sustainability are global problems – and data about these needs to be shared from country to country to tackle it on a worldwide scale.

Open Data Institute

open data institute

#### Learn with Lowena



#### We're jammin'

Volunteering is critical to Open Technology.

Alongside attending events to improve my programming skills, I wanted to give something back to others, which is why I started volunteering at my local Raspberry Jam. Raspberry Jams are local meetups organised and run by volunteers in the community. There are all sorts of great stuff happening at these events.

One of the activities I have engaged in is helping to create workshops and to teach the content to kids who come along for an hour or two. Hobbyists - who are interested in the technology - also come along for the chance to share or show and tell various projects they have made and to talk about how they made it. Sometimes they even give a little demo of something they have made or invented which is always fun!

I'd highly recommend seeing if there is a Raspberry Jam near you and whether they have got an online meetup you can swing along to. It's a great way to start to engage with technology.

My little bit of advice for this week: be proud of your projects! Show off that little thing you made! Even if it's not as technologically complex as other people's, it's an achievement others will be interested in. Where better for you to do that than a supportive group like you'd find at a Raspberry Jam?

**LOWENA** Student, Cambridge Univeristy





## Nasa



#### **People Power**

People are the capital of open source. From the leaders of the software project whose idea may have begun as a labour of love or as a passion project, to those that they convince that the software being developed is worthy of their contribution. People power is the core of open source.

Part of sustaining any healthy open source ecosystem is curating, interesting, nurturing, and developing people who will maintain, develop, fix, and evolve the software. People are responsible for more than just the software, they are the community of the project. Part of building open source involves creating the open source community of people.

However, life gets in the way...

How do we maintain the people's interest in the open source project? By making it fun; innovative, by being inclusive, and honoring their time, effort and contributions. In other words, by lowering the friction required to contribute to the project. One of the core elements of people power is ensuring that the people are enjoying their labor of love; their job, their raison d'etre for being there in your open source project.

#### Chris

Chief Technology and Innovation Officer, NASA Jet Propulsion Laboratory







"I'm bored Aunt Phippy," Zee slouched further down on the couch. "What are we going to do today?"

"Why not go see the animals?" said Phippy with a smile. "We'll go to the zoo!"

"Yeah!" Zee let out a whoop and ran to find some shoes.

The first animals they came upon were the size of squirrels.

Furry and blue, each little animal carried a tiny box as they unceasingly zipped back and forth.

"Those," said Phippy, "are Pods. All day and all night, they run back and forth carrying their little containers.

"Is that all they do, Aunt Phippy?" "Yup,Zee. For their entire lives, that's all the Pods do. They run."





In Kubernetes, Pods are responsible for running your containers. Every Pod holds at least one container, and controls the execution of that container. When the containers exit, the Pod dies too.

As Phippy and Zee walked on, they saw a large glass enclosure. Pressed against the window was a line of happy little meerkat faces. "Those are

the ReplicaSets," said Phippy. As Zee watched, the face on the right grinned widely, and tipped itself off the ledge. In unison, the others hopped over to fill the space, and then an identical meerkat scurried up on the left side.

"Every time one little replica falls, another one hops right up," explained Phippy.

A ReplicaSet ensures that a set of identically configured Pods are running at the desired replica count. If a Pod drops off, the ReplicaSet brings a new one online as a replacement. **To be continued...** 



## Entrepreneur in residence



#### What is the best license for my open source project?

In reality, this really depends on what you want to achieve with your project but there are essentially two approaches: one where you want developers to use your code, but with some level of control, and one where you are happy for the code to be freely available and used with no obligation at all. In between, there are other types of licenses, but in general, licenses tend to be seen as either "permissive" or "copyleft", with permissive offering the most freedom and copyleft requiring some level of obligation. The most popular modern permissive license is the Apache license. The most popular copyleft license is the General Public License (GPL). Both these license models are very important to the open source ecosystem.

One key difference between the two is if a developer accesses the GPL code and modifies it in some way, then the modified changes must also be licensed under the same GPL. Whereas the Apache license does not require any modifications to be relicensed, the code is out there for anyone to do whatever they wish. This gives individual developers much more freedom to innovate and is the main reason the Apache license works really well for general open source projects and is good at quickly attracting a community of developers.

Matt President & Co-Founder, Jetstack



Word game

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ACHIEVEMENT	BINARY	CAMP
CONTRIBUTION	DEVELOPER	DIVERSITY
ENGINEER	EZINE	GIVEAWAY
GLOVE	HELEN	HOLIDAY
INCLUSION	INSPIRATION	INTERNET
LEADERSHIP	NOTEBOOK	OPEN
OPENKIDSCAMP	OPENUK	PROGRAM
SUMMER	TECHNOLOGY	VISION



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# Thanks for reading!

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#### **Instructions Lesson 3**

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