

WorldSkills UK

Web Development

2024 Technical Handbook

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INTRODUCTION

Web Developer

“A Web Developer is a type of programmer focused on creating applications for the World Wide Web or for distributed networks, often using protocols such as HTTP to communicate between a Web server and a client's browser. They primarily work with computer languages like HTML/CSS, JavaScript, PHP and SQL, among others. The role of a web developer centres on the technical and programming side of building a website or web application, distinguishing them from Web Designers, who are responsible for the visual design and layout. However, it's common for individuals in this field to possess skills in both development and design.”

Web Developers mix creativity and technical know-how to build and manage websites or web applications, using coding and various software tools in an industry that changes quickly. Skills in web development languages are highly desired, especially in JavaScript and PHP, because more traditional programs are being adapted for use on the internet. Building a website (or web application) involves a range of skills, including design, writing and maintaining code, and looking after databases. Making sure that the developed website or application can be used by everyone, no matter where they are or what device they're using, is a key part of a web developer skills set.



COMPETITION OVERVIEW

During the **WorldSkills UK - Web Development** competition, participants will receive a brief to work throughout the three competition stages. The competition includes a range of competencies for web designers and developers. The competition journey will take you through the following steps outlined below:



STAGE 1: Registration

Once you have completed your registration (and accepted all terms and conditions) you will be emailed a link for the entry stage with an initial online assessment.

STAGE 2: Entry Stage

When the entry stage has been completed, you will be notified to let you know if you have scored high enough to go through to the national qualifiers (the semi-final round). You will then be informed when and how the National Qualifiers will take place.

STAGE 3: National Qualifiers

In 2024, the National Qualifiers are planned to be held online, lasting for three hours. The evaluation will concentrate on participants' skills in coding, particularly for the *Design Implementation* aspect. While the use of HTML, CSS, and JavaScript will be assessed, the incorporation of frameworks such as [React](#), [Vue.js](#), [Vite](#) or [Bootstrap](#) is encouraged but not mandatory.

Ensure you're ready to compete in the national qualifiers by looking at the online training resources, core competencies and marking guidelines below. This handbook outlines the type of tasks you will be expected to carry out. Ask your lecturer/employer for help in any areas where you feel you could improve, and try to gain practical experience in all the task areas of the competition.

STAGE 4: WorldSkills UK National Finals

The **8 highest scoring competitors** across all the National Qualifiers will be invited to compete at the finals in a venue, details of which will be confirmed at a later time.

Make sure you're prepared for the UK's National Finals by reviewing the essential skills and marking criteria provided below. These guidelines will give you an idea of the competencies you are expected to demonstrate. If there are areas you think you need to enhance, seek assistance from your lecturer or employer. Additionally, aim to acquire hands-on experience in every task area of the competition.

STAGE 5: International Competitions

After the National Finals, competitors can explore numerous other opportunities. Those who are of the appropriate age and demonstrate exceptional skill, passion, and determination in the national

finals will have the chance to train for and compete in the EuroSkills (<https://worldskillseurope.org>) and WorldSkills (<https://worldskills.org>) international competitions.



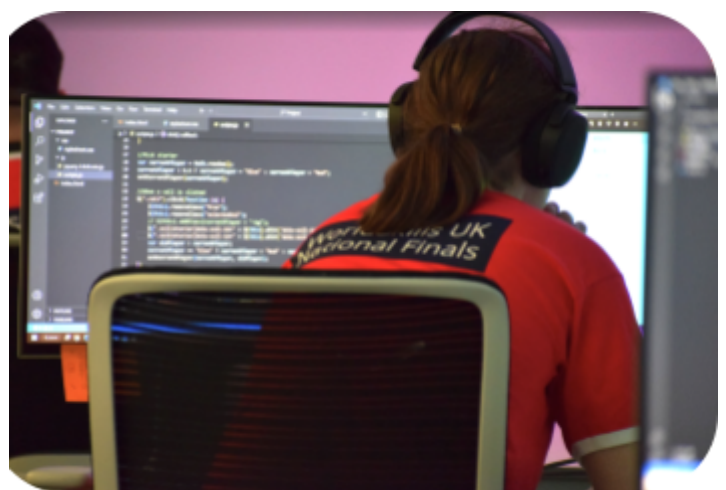
For those who do not meet the criteria for international competition, the Skills Champions programme offers an alternative path for continued participation. This programme provides opportunities to collaborate with WorldSkills UK and engage with schools, colleges, and various events to motivate future generations.

Moreover, if you are interested in training, you might consider assisting WorldSkills UK in planning, training activities, and even contributing to the success of future National Finals.

CAREERS, JOBS & ROLES

Web development offers a diverse range of career paths, each with its own set of specialised skills and roles that cater to different aspects of creating and managing websites and applications. From the artistic and functional designs crafted by Web Designers, who prioritise user experience and aesthetic appeal, to Front-End Developers who bring these designs to life through code, ensuring seamless interaction and responsive design across devices. Back-End Developers focus on the server-side, handling database management, API integration, and security compliance, which are essential for the functionality and reliability of web applications.

Full Stack Developers bridge the gap between front-end and back-end development, possessing a broad skill set that covers the entire development process. With the ability to understand and work on all aspects of web application development, Full Stack Developers have comprehensive knowledge that makes them versatile and crucial in any development team. Each role within web development has distinct technologies and tools that professionals must master, from design software like Adobe Creative Suite to programming languages such as JavaScript, and frameworks like React and Node.js to PHP and Laravel.



As digital needs grow and transform, so do the roles of web developers, who continuously evolve to meet the demands of an industry that sits at the heart of the modern world's digital experience.

Web Designer

Key Skills

Design Principles	★★★★★★
User Experience (UX)	★★★★★
User Interface (UI)	★★★★★
Graphic Design	★★★
Coding	★



Key Technologies

- Design Tools: Figma, Adobe Creative Suite (Photoshop, Illustrator, XD), Sketch
- Prototyping Tools: InVision, Adobe XD, Axure
- Front-End Basics: HTML, CSS (Understanding)
- Content Management Systems: WordPress, Joomla, Drupal (Familiarity)
- Version Control: Basic knowledge of Git

Salary & Job Roles

Web designers typically start with salaries ranging from £18,000 to £24,000, depending on their skill level and location. Experienced web designers can earn upwards of £35,000 to £50,000. They may specialize in certain areas such as UX/UI design or advance into roles like Art Director or Creative Lead. Web designers focus on the visual aesthetics and usability of a website.

They bridge the gap between the website's functionality and its aesthetics, ensuring that the end product is not only functional but also visually compelling. Their role often involves close collaboration with front-end developers to bring their designs to life in the web environment.

Front-end Web Developer

Key Skills

JavaScript Programming	★★★★★★
Responsive Design	★★★★★★
Cross-Browser Compatibility:	★★★★★
Performance Optimisation	★★★★★
Testing / Debugging	★★★



Key Technologies

- HTML5
- CSS3/SASS
- JavaScript (ES6+)
- Frameworks/Libraries: React.js, Angular, Vue.js
- Tools: npm, Webpack, Babel
- Version Control: Git

Salary & Job Roles

Starting salaries for front-end developers can vary widely, with a typical range being from £25,000 to £35,000 depending on the region, experience, and the complexity of the role.

With experience, front-end developers can expect to move into senior roles, potentially leading design and development teams, with salaries that can exceed £50,000.

Back-end Web Developer

Key Skills

Server-Side Languages	★★★★★★
Database Management	★★★★★★
API Dev./Integration	★★★★★
Security Compliances	★★★★★
Version Control Systems	★★★★★



Key Technologies

- Server-Side Frameworks: Express for Node.js, Laravel for PHP
- Databases: MySQL, PostgreSQL, MongoDB
- Containerization and Orchestration: Docker, Kubernetes
- Cloud Services: AWS, Google Cloud Platform, Azure
- Continuous Integration/Continuous Deployment (CI/CD): Jenkins, GitLab CI

Salary & Job Roles

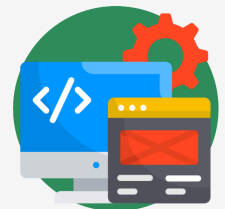
The starting salary for back-end developers can vary, with entry-level positions typically ranging from £27,000 to £35,000. With experience and specialized skills, back-end developers can progress to senior positions with salaries that can rise significantly, often reaching upwards of £60,000, especially in high-demand areas or with expertise in specific, sought-after technologies.

The back-end developer role is essential for any dynamic website or web application that requires server-side data processing, database management, and application logic. The above skills and technologies are crucial for a back-end developer to build robust and secure web applications.

Full Stack Web Developer

Key Skills

Front-End Technology	★★★★★★
Back-End Technology	★★★★★★
Database Management	★★★★★
Version Control / Git	★★★★★
Testing and Debugging	★★★★★



Key Technologies

- Front-End: HTML5, CSS3, JavaScript, React.js, Angular, Vue.js
- Back-End: PHP, Node.js, Express, Django, Flask, Ruby on Rails
- Databases: MySQL, PostgreSQL, MongoDB
- DevOps: Docker, Kubernetes, Jenkins, AWS, Azure
- Tools: npm, webpack, babel, Git

Salary & Job Roles

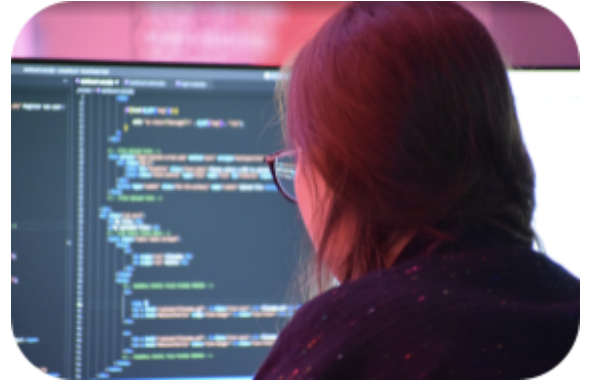
The starting salary for full stack developers is typically around £30,000 to £40,000, with the potential to grow significantly. Skilled full stack developers can command salaries of £50,000 to £70,000 or more, depending on their experience, expertise, and the complexity of their work. As they can handle both client and server software, they are highly valued for their versatility in building complete web applications and often lead projects or teams.

Full stack developers have a broad skill set that covers both front-end and back-end development, allowing them to understand and work on all aspects of web application development. Their knowledge spans the full breadth of the technology stack, from user-facing features to server-side data handling, making them invaluable assets to any development team.

CORE COMPETENCIES

Core competencies, which constitute the essential set of skills and knowledge in Web Development, are evaluated throughout the competition. These competencies are critical for showcasing expertise not only in front-end technologies but also in back-end development, involving server-side languages, database management, and application frameworks.

In the detailed outline provided below, the specific core competencies assessed at various stages of the competition are highlighted. This includes foundational skills in HTML, CSS, and JavaScript for front-end development, alongside proficiency in back-end technologies such as SQL for database management, PHP for server-side scripting along with PHP frameworks for web application development.



The ability of participants to effectively employ these technologies in creating comprehensive, responsive, and user-friendly web applications will be evaluated. Additionally, their capability to utilise frameworks and libraries such as React, Vue.js, Vite, or Bootstrap for front-end development, and their skill in applying back-end technologies to solve problems and implement solutions within a comprehensive web development context, will be assessed.

This matrix (<http://tinyurl.com/wsuk-matrix>) serves as a comprehensive guide that aligns with every phase of the WorldSkills competition, starting from the initial Stage 1 and extending to the global International stage. This detailed framework is designed to match the skills and assessment criteria required at each successive level of competitions.

TECHNOLOGICAL SKILLS

Web Development is typically divided into two main categories: front-end and back-end development. Each category uses different programming languages tailored to their specific tasks.

Front-End Development

This is the part of Web Development that involves building what users see and interact with in their web browsers. The cornerstone languages for front-end development include HTML, which is used for the structure and layout of web pages. CSS is then applied to style and design the visual elements, ensuring that the site looks appealing and is user-friendly. JavaScript is added to the mix to bring pages to life with interactive and dynamic features, such as responding to user actions, animating elements on the page, and communicating with web services.

Back-End Development

On the other hand, back-end development is focused on the server side, dealing with the database and server logic. It's the engine room of a website or web application. Languages commonly used

in back-end development include PHP, a widely-used open-source scripting language and JavaScript via Node.js, which allows developers to use JavaScript on the server side as well. SQL is indispensable for database management, enabling developers to retrieve and manipulate data efficiently. These languages work together to process user requests, perform computations, and serve content to the front end.

Note: *While the introduction above outlines the key languages for front-end and back-end development as it pertains to the competition, it is noteworthy to mention that the field of back-end development encompasses a broader range of programming languages. Languages such as Java, Ruby, Python or Go are also integral to back-end development, offering different features and benefits. However, these are not assessed within the scope of this particular competition, but they hold significant value in the industry for their robustness, scalability, and performance in various web development environments.*

Development Technologies (Frameworks, libraries and databases)

In addition to core programming languages, web development extensively utilises frameworks and libraries to streamline the building process and enhance functionality. These tools provide pre-written code snippets, modules, and functionalities that developers can use to speed up development and ensure best practices.

For Front-End Development

Bootstrap - a powerful and popular front-end framework used for creating responsive and mobile-first web pages. Bootstrap provides a set of CSS and JavaScript tools that simplify the design process.

React - a declarative, efficient, and flexible JavaScript library for building user interfaces. It allows developers to create large web applications that can change data, without reloading the page.

Vue.js - a progressive framework for building user interfaces. Unlike other monolithic frameworks, Vue is designed from the ground up to be incrementally adoptable.

For Back-End Development:

Laravel - a web application framework with expressive, elegant syntax for back-end development in PHP. It provides a robust set of tools and an application architecture that includes features like an ORM, routing, authentication, and more.

Node.js - a JavaScript runtime built on Chrome's V8 engine, designed for developing scalable network applications. Node.js uses JavaScript for server-side scripting, offering a unified programming language for both the server and client sides. It's supported by a vast library of NPM packages, enhancing its functionality and making it a versatile choice for developers who prefer using JavaScript across both front-end and back-end development, complementing PHP frameworks like Laravel with a unified coding language experience.

MySQL - a widely used relational database management system (RDBMS) that utilises Structured Query Language (SQL) for managing, adding, accessing, and processing data stored in a database. Known for its reliability, scalability, and speed, MySQL is an essential tool for developers working on web applications that require efficient data storage and retrieval. It allows for the creation of complex databases that can handle vast amounts of data, making it an indispensable part of the back-end technology stack.

It's important to note that while many other frameworks and libraries exist and are used professionally, the ones listed above are included in the scope of the competition. They have been selected for their wide adoption, strong communities, comprehensive documentation, and the ability to cater to various aspects of both front-end and back-end development. Each brings its own advantages to the development process and, depending on the project requirements and developer preference, can significantly impact the efficiency and quality of the final product.

WEB DEVELOPMENT TOOLS AND RESOURCES

Below, a list of the current software, applications, libraries and frameworks for use in the WorldSkills competitions is provided for your convenience. It is important to note that not all the software listed are required; participants are encouraged to select the applications that best suit their preferences and needs.

As a recommendation, consider focusing on software that aligns with your strengths and project requirements, ensuring you are comfortable and proficient with your chosen tools to maximise your performance in the competition.

R = Recommended

M = Must

Code Editors (IDEs)		
Tool	Available Platform/Purpose	Licence Type
Visual Studio Code (R ¹)	Win/macOS/Linux	Free
PhpStorm (R ²)	Win/macOS/Linux	Free (EDU Licence)
WebStorm	Win/macOS/Linux	Free (EDU Licence)
Design Tools		
Figma (R)	Win/macOS	Free (3 Collaborative)
Lunacy	Win/macOS/Linux	Free
Axure (Prototyping)	Win/macOS	Free (EDU Licence)
Database Tools		

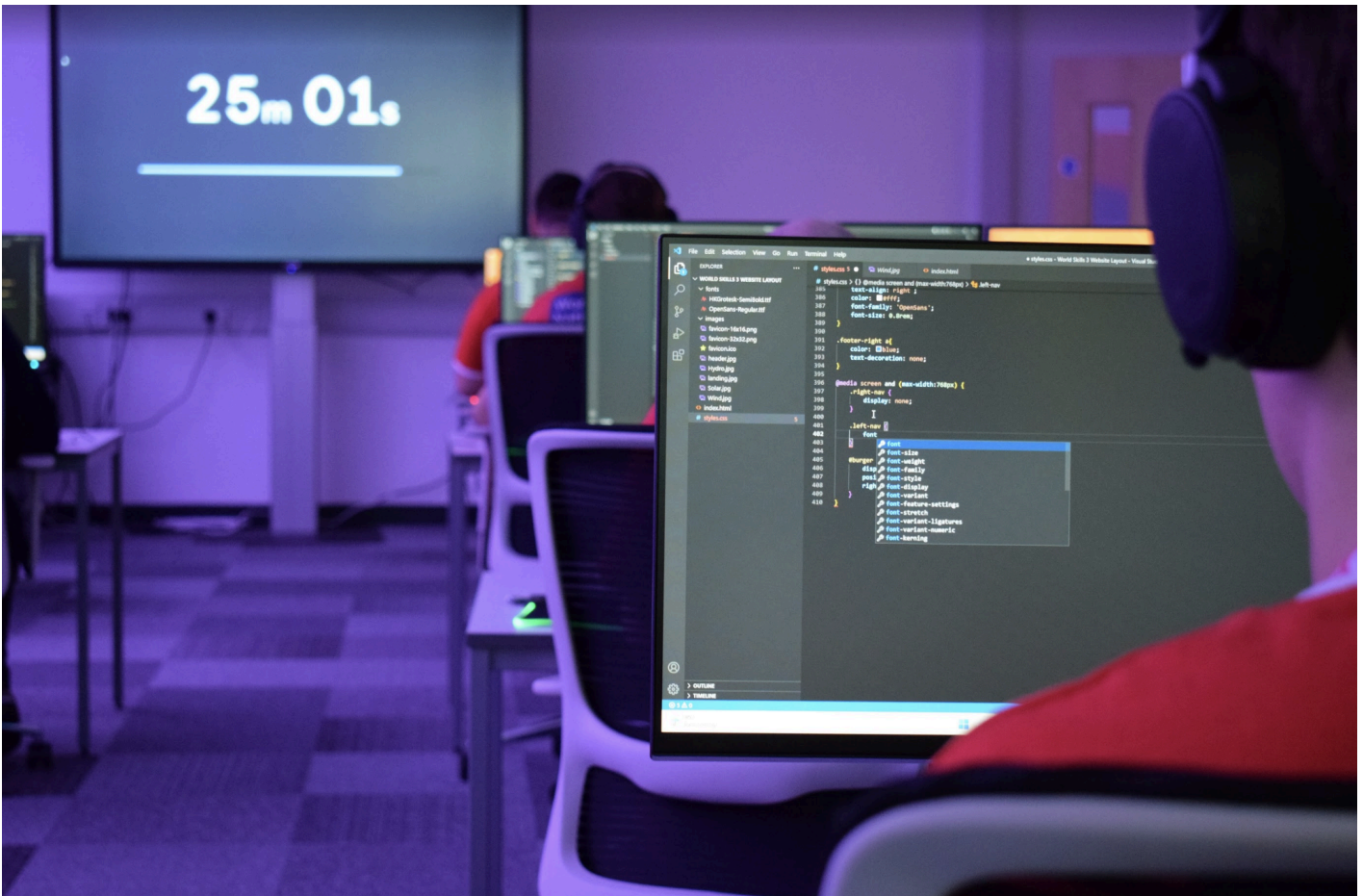
MySQL (R)	Win/macOS/Linux (Part of localhosts as well)	Free
PostgreSQL	Win/macOS/Linux	Free
Cross-platform web servers (localhosts)		
AMPPS (R ¹)	Win/macOS	Free (No automatic updates)
XAMPP (R ²)	Win/macOS/Linux	Free
WampServer	Win	Free
Version Control		
GitHub (R)	Win/macOS/Linux	Free + (EDU Licence)
GitLab	Win/macOS/Linux	Free
Frameworks and Libraries		
Bootstrap	CSS/JS	Free
TailwindCSS	CSS	Free
Font Awesome	Icons	Free
Google Fonts	Icons	Free
React	JS	Free
Vue.js	JS	Free
Laravel	PHP	Free
Node.js	JS	Free
NPM	Library & Package Manager	Free - Part of Node.js
Browsers and plugins		
Chrome	Win/macOS/Linux	Free
Mozilla	Win/macOS/Linux	Free
Edge	Win/macOS/Linux	Free
AXE DevTools (R)	Chrome/Mozilla/Edge	Free
WCAG Colour Contrast	Chrome/Mozilla/Edge	Free
WAVE Accessibility	Chrome/Mozilla/Edge	Free
Learning material and additional resource		
DevDocs (M)	<i>Official Documentations used in competition</i>	Free
Laracast	Laravel Learning	Free

CodeWars	Peer Skill Development	Free
CodeAcademy	Interactive Courses	Paid (Discount for Students)
freeCodeCamp	Interactive Courses	Free
SoloLearn	Interactive Courses	Paid
HappyCoding	Interactive Courses	Free

Competition Environment

Although most applications are cross-platform, in all WorldSkills competitions only Microsoft Windows (10/11) is used along with a dual monitors setup environment. All assessment work is to be completed without internet access.

All the software listed above are easily deployable and widely used in Schools, Colleges and Universities in the UK and internationally. Most applications also provide user-level installers, or standalone/portable editions if deployment is 'challenging', but not always.



PRE-COMPETITION ACTIVITY

Alongside the marking guidelines and other materials detailed in this document, competitors are advised to get ready for the competitions by utilising the example assessments given below. The tasks included in the pre-competition activities, drawn from past competitions, are intended to demonstrate the kinds of tasks and skills that will be expected from participants.

Sample Assessments and Training Resources

Example assessments for each module can be accessed and downloaded from the resource repository provided below. Additionally, a variety of training materials, expert guidance, and examples of student work are being added to assist participants in preparing for this year's competition.

[Sample Test Projects](http://tinyurl.com/wsuk-tps) (<http://tinyurl.com/wsuk-tps>)

Entry Stage (Stage 2) - What to expect

Shortly after registration closes, you will be sent details of this year's online entry assessment. This stage of the competition will be online and will be testing your knowledge of:

- Web technologies and browsers
- File types
- Core HTML, CSS, JS & PHP knowledge
- Accessibility

Participants will be able to take the test one time only, and the test will be formatted as a quiz with a duration of 1 hour and 45 questions.

National Qualifier (Stage 3) - What to expect

For the national qualifier, you will be required to put your coding skills to test.

A brief/specification, a mock-up, assets (such as images and logos), and text for a sample website or web application will be provided to you. You will need to use your practical skills in HTML, CSS, and JavaScript to create a functioning webpage that matches the given design.

This task will take place under supervised conditions on a remote assessment platform, and you will have 3 hours to complete it. Full instructions will be given once you reach this stage.

National Finals (Stage 4) - What to expect

The National Finals are designed to put you to the test. This competition is designed to test all core competencies and will be assessed through four modules spread over two days. You will be required to compete in-person at the host venue.

Module A - Speed Test

You will be required to solve a series of mini-tasks that are categorised based on the approximate required time to solve them:

- Easy / 5 min
- Medium / 5–15 min
- Complex / 15-30 min

Assessment Duration: 2.5 or 3 hours

Internet Access: None

This aspect will assess your organisational skills, time management and ability to work under pressure.

Module B - Design Implementation

You will be required to develop a working website or web application following a provided specification using HTML, CSS and JavaScript. Given a brief, assets, and content, you will be expected to match the design as closely as possible. Best practice, accessibility (including adaptive/responsive website development techniques) and advanced use of CSS will also be assessed.

Assessment Duration: 2.5 or 3 hours

Internet Access: None

Module C - Front-End Development

You will be required to implement a solution to a given set of tasks using JavaScript. These tasks may involve adding interactivity through events and DOM manipulation, debugging and fixing erroneous code, and demonstrating best practices. Maintaining a clear project structure and documenting your code well are also assessed.

Assessment Duration: 2.5 or 3 hours

Internet Access: None

Module D - Back-End Development

You will be required to develop a website or web application with server-side functionality. Typical requirements include authentication; interacting with a database to create, read, update, and delete data (CRUD); and securing parts vulnerable to exploits. You may write your solution in one of the permitted back-end languages of your choice.

Assessment Duration: 2.5 or 3 hours

Internet Access: None

RESOURCES AND FURTHER INFORMATION

If you have any questions regarding the competition, please do not hesitate to get in touch.

As part of the competition and its qualifying stages, we're organising some preparatory and training sessions. These sessions will be led by seasoned professionals in the field, previous competitors, and members of the national and international judging panels. We strongly recommend that all participants, as well as their tutors, take full advantage of these valuable learning opportunities. Engaging with these sessions can provide deeper insights into the industry and equip you with advanced techniques and knowledge to excel in the competition.

Primary Web Development Technologies

