Postgraduate Certificate
Parallel Performance

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Postgraduate Certificate

Parallel Performance

- Modality: **online**
- Duration: **6 weeks**
- Certificate: **TECH Technological University**
- Dedication: **16h/week**
- Schedule: **at your own pace**
- Exams: **online**

Website: www.techtitute.com/pk/information-technology/postgraduate-certificate/postgraduate-certificate-parallel-performamce

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01

Introduction

To design and implement efficient parallel architectures, it is essential to be an expert in Parallel Performance itself. In parallel algorithms, the evaluation of their performance depends not only on the size of the *input* and execution time, but also on factors such as the number of processors and the communication model of the platform. By mastering these aspects, the computer scientist will be able to improve their competencies in Parallel Performance, specializing even more in this specialty that is currently in high demand. This Postgraduate Certificate offers, precisely, an exhaustive tour of the most important parameters of Parallel Performance, developed by a teaching team versed in this field. The 100% online format of the degree also makes it easier to combine it with other professional or personal responsibilities.

Perfect your methods of analytics and execution of Parallel Performance, to position yourself as a reference computer scientist in parallel architectures"

Some aspects such as communications, load balancing, input/output management or memory access can penalize the overall performance of parallel applications. The computer scientist who masters these areas will have greater control over the parallel architectures on which they work, and can considerably improve their overall performance.

This is the focus of this Postgraduate Certificate, which also analyzes cross-platform parallel computing and hybrid computing, combining different parallel programming paradigms. All this has been developed by a teaching team with experience in large multinational companies, leading large-scale parallel computing projects.

This implies that the contents have not only the most advanced technological theory, but also the necessary practical computational perspective to know how to apply all this knowledge in real computing environments. The student will also have the advantage of being able to freely access all the content, without fixed schedules or face-to-face classes. The syllabus can be downloaded in its entirety from any device with internet access and can be studied at the pace chosen by the student.

This **Postgraduate Certificate in Parallel Performance** contains the most comprehensive and up-to-date scientific program on the market. The most important features include:

- The development of case studies presented by experts in Parallel and Distributed Computing
- The graphic, schematic and eminently practical contents with which it is conceived provide practical information on those disciplines that are essential for professional practice
- Practical exercises where self-assessment can be used to improve learning
- Its special emphasis on innovative methodologies
- Theoretical lessons, questions for experts and individual reflection work
- Content that is accessible from any fixed or portable device with an Internet connection

Access content developed by IT experts to take your parallel systems skills to the highest level, significantly improving their performance"

Sign up now to start improving the Parallel Performance of your IT systems and architectures, expertly knowing which areas are most important for analysis and performance"

You will have at your disposal the best audiovisual resources, with videos in detail, simulated cases and summaries for each of the topics of this certificate.

Join the largest online academic institution in the world, with a teaching and technical team committed to your professional improvement.

The program's teaching staff includes professionals from the sector who contribute their work experience to this training program, as well as renowned specialists from leading societies and prestigious universities.

The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide immersive training programmed to train in real situations.

This program is designed around Problem-Based Learning, whereby the professional must try to solve the different professional practice situations that arise during the academic year. For this purpose, the student will be assisted by an innovative interactive video system created by renowned and experienced experts.

02

Objectives

By having a better command and control of Parallel Performance, the IT specialist will be able to maximize the performance of their systems, making them more reliable, faster and more stable. This is undoubtedly a professional quality that will boost the graduate's career, so all the contents of this certificate are focused on getting the computer scientist to master this field, providing both the necessary technological theory and the practical methodology to carry it out effectively in different computational environments.

You will finish this Postgraduate Certificate having much greater control over your parallel systems, having a better understanding of the source of failures or adverse circumstances that may occur"

General objectives

- Determine the aspects that penalize the performance of Parallel Applications
- Analyze advanced techniques for parallel code optimization, communication optimization in distributed memory systems, affinity control, load balancing and parallel input/output management
- Examine Hybrid Programming models for systems with multiple hardware accelerators and Hybrid Programming models for systems with shared/distributed memory

You will enhance your skills in Parallel Performance throughout the degree, being able to apply performance analysis and evaluation techniques on the fly"

Specific objectives

- Analyze the aspects of parallel algorithms that affect their performance and scalability
- Establish the main performance and scalability metrics of parallel algorithms
- Examine the main techniques for comparing parallel algorithms
- Identify the constraints that hardware resources impose on Parallelization
- Determine best practices for the performance of; shared memory parallel programs, message passing parallel programs, hybrid parallel programs and parallel programs with heterogeneous computation
- Compile the most advanced tools for analyzing the performance of parallel algorithms
- Introduce the main patterns of parallel processing
- Specify a robust procedure for the definition of high-performance parallel programs

03

Course Management

The teaching team in charge of this degree has accumulated outstanding experience in the field of parallel computing, which has enabled them to become true experts in the field. Thanks to their extensive work on numerous international projects, the syllabus is oriented towards the highest level of IT practice, endorsing both the technological quality of the theory and the practical usefulness of all the Parallel Performance methods provided.

Benefit from the expertise and professional know-how of a teaching team with extensive years of work in the best IT companies in the world"

Management

Mr. Olalla Bonal, Martín

- Technical Sales Blockchain Specialist in IBM
- Blockchain Hyperledger and Ethereum Architecture Manager at Blocknitive
- Director of the Blockchain area at PSS Information Technologies.
- Chief Information Officer in ePETID – Global Animal Health
- IT Infrastructure Architect at Bankia - wdoIT (IBM - Bankia Join Venture)
- Project Director and Manager in Daynet Servicios Integrales
- Director of Technology at Wiron Construcciones Modulares
- Head of IT Department at Dayfisa
- Head of IT Department at Dell Computer, Majsa and Hippo Viajes
- Electronics Technician in IPFP Juan de la Cierva

Professors

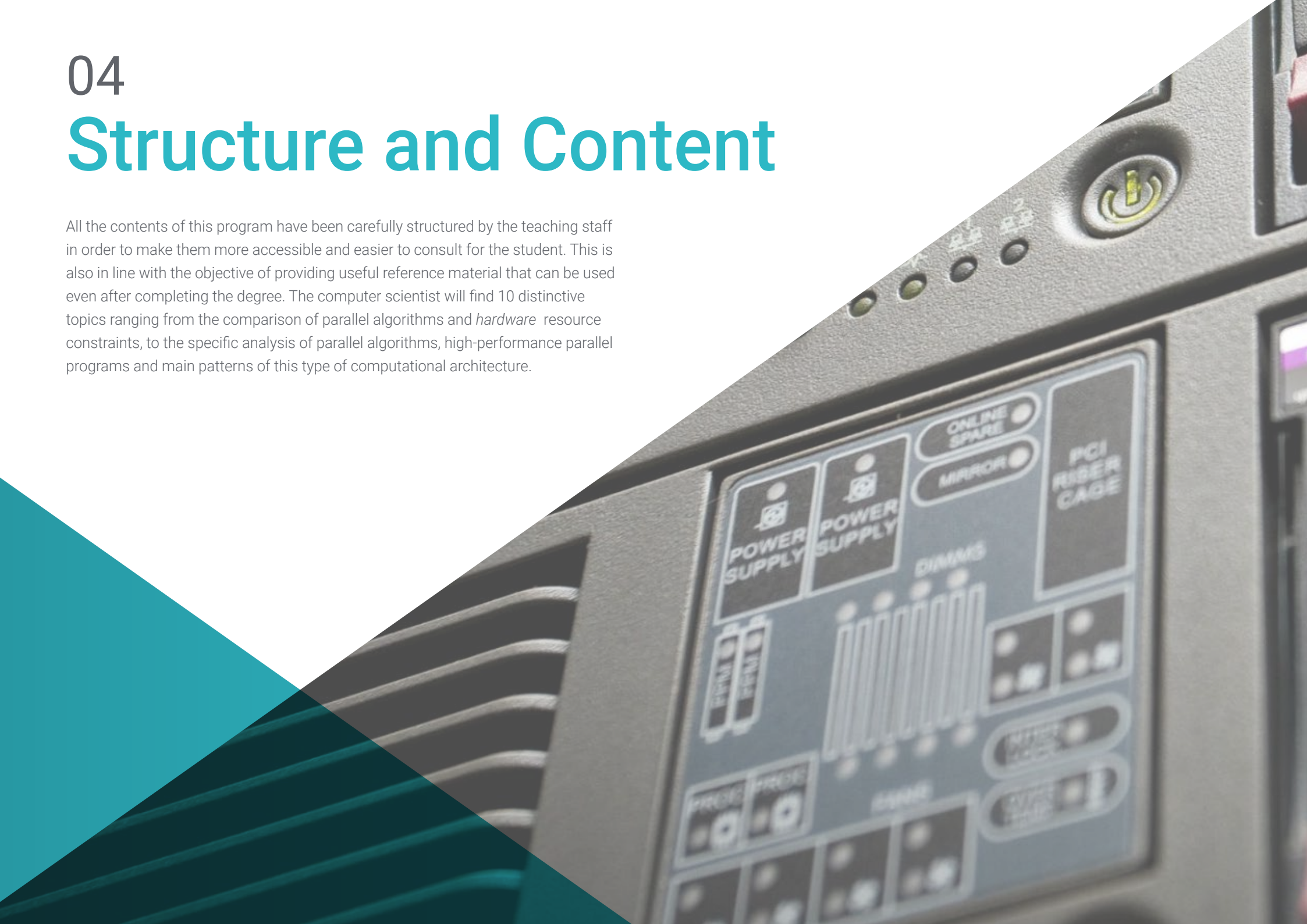
Mr. Villot Guisán, Pablo

- Architect responsible for numerous technology projects at KPMG, working with Global Cars SCF, Zurich Santander, Flash Allfunds, Asentify SCF and Plataforma Next SCF
- Architect responsible for several projects at Everis, with work in Open Banking Platform, Optimum Project: SCIB and H2020 Cloud Center of Excellence: Provenance
- Development of Blockchain Solutions for the Ministry of the Presidency, Repsol and Iberia.
- Graduated in Computer Engineering at the University of La Coruña.
- Microsoft MSCA Certification: Cloud Platform

04

Structure and Content

All the contents of this program have been carefully structured by the teaching staff in order to make them more accessible and easier to consult for the student. This is also in line with the objective of providing useful reference material that can be used even after completing the degree. The computer scientist will find 10 distinctive topics ranging from the comparison of parallel algorithms and *hardware* resource constraints, to the specific analysis of parallel algorithms, high-performance parallel programs and main patterns of this type of computational architecture.



All the content of the Postgraduate Certificate is available for download, and can be consulted after the degree from your tablet, smartphone or computer of choice"

Module 1. Parallel Performance

1.1. Performance of Parallel Algorithms
- 1.1.1. Amdahl's Law
- 1.1.2. Gustafson's Law
- 1.1.3. Performance Metrics and Scalability of Parallel Algorithms

1.2. Comparison of Parallel Algorithms
- 1.2.1. *Benchmarking*
- 1.2.2. Mathematical Analysis of Parallel Algorithms
- 1.2.3. Asymptotic Analysis of Parallel Algorithms

1.3. *Hardware* Resource Restrictions
- 1.3.1. Memory
- 1.3.2. Processing
- 1.3.3. Communication
- 1.3.4. Dynamic Resource Partitioning

1.4. Performance of Parallel Programs with Shared Memory
- 1.4.1. Optimal Division into Tasks
- 1.4.2. Thread Affinity
- 1.4.3. SIMD Parallelism
- 1.4.4. Parallel Programs with Shared Memory Examples:

1.5. Parallel Program Performance by Message Passing
- 1.5.1. Parallel Program Performance by Message Passing
- 1.5.2. MPI Communication Optimization
- 1.5.3. Affinity Control and Load Balancing
- 1.5.4. Parallel I/O
- 1.5.5. Parallel Programs by Message Passing Examples:

1.6. Hybrid Parallel Program Performance
- 1.6.1. Hybrid Parallel Program Performance
- 1.6.2. Hybrid Programming for Shared/Distributed Memory Systems
- 1.6.3. Hybrid Parallel Programs Examples:

1.7. Program Performance with Heterogeneous Computing
  1.7.1. Program Performance with Heterogeneous Computing
  1.7.2. Hybrid Programming for Systems with Multiple Hardware Accelerators
  1.7.3. Programs with Heterogeneous Computing Examples:
1.8. Performance Analysis of Parallel Algorithms
  1.8.1. Performance Analysis of Parallel Algorithms
  1.8.2. Performance Analysis of Parallel Algorithms Tools
  1.8.3. Performance Analysis of Parallel Algorithms Recommendations
1.9. Parallel Patterns
  1.9.1. Parallel Patterns
  1.9.2. Main Parallel Patterns
  1.9.3. Parallel Patterns Comparison
1.10. High-Performance Parallel Programs
  1.10.1. Process
  1.10.2. High-Performance Parallel Programs
  1.10.3. High-Performance Parallel Programs Real Uses

The large amount of support material, including supplementary readings and self-awareness exercises, will be of great help to your study work"

05

Methodology

This training program offers a different way of learning. Our methodology uses a cyclical learning approach: ***Re-learning***.

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the ***New England Journal of Medicine*** have considered it to be one of the most effective.

Discover Re-learning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"

At TECH we use the Case Method

Our program offers a revolutionary method of skills and knowledge development. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

At TECH, you will experience a way of learning that is shaking the foundations of traditional universities around the world"

We are the first online university to combine Harvard Business School case studies with a 100% online learning system based on repetition.

The student will learn, through collaborative activities and real cases, how to solve complex situations in real business environments.

A learning method that is different and innovative.

This intensive Information Technology program at TECH Technological University prepares you to face all the challenges in this field, both nationally and internationally. We are committed to promoting your personal and professional growth, the best way to strive for success, that is why at TECH Technological University you will use Harvard *case studies*, with which we have a strategic agreement that allows us, to offer you material from the best university in the world.

> *Our program prepares you to face new challenges in uncertain environments and achieve success in your career"*

The case method has been the most widely used learning system among the world's leading Information Technology schools for as long as they have existed. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the course, students will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

Re-learning Methodology

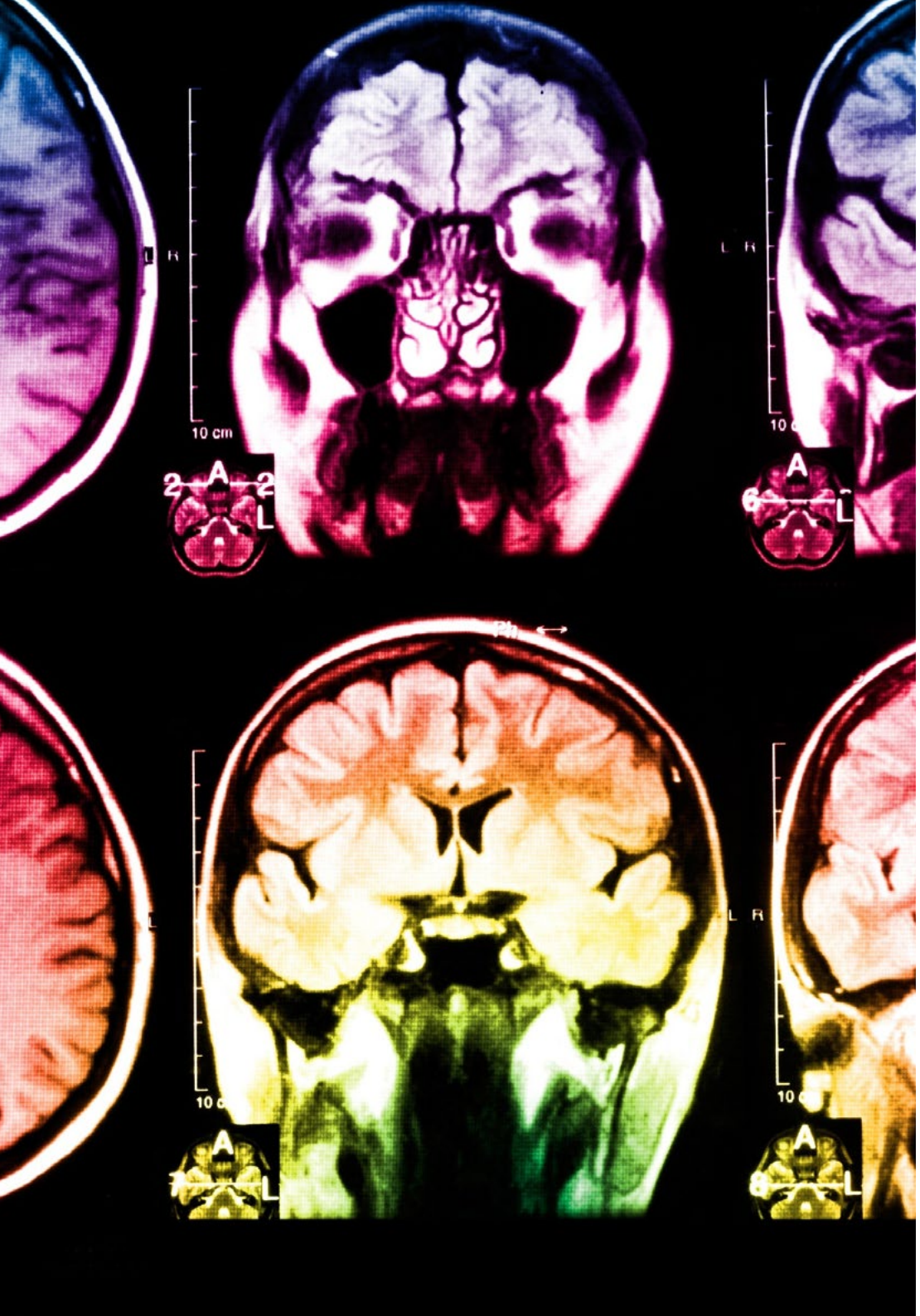
Our university is the first in the world to combine Harvard University *case studies* with a 100%-online learning system based on repetition, which combines different teaching elements in each lesson.

We enhance Harvard *case studies* with the best 100% online teaching method: Re-learning.

In 2019, we obtained the best learning results of all online universities in the world.

At TECH you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Re-learning.

Our university is the only university in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.



In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically. This methodology has trained more than 650.000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

Re-learning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.

This program offers the best educational material, prepared with professionals in mind:

Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.

Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

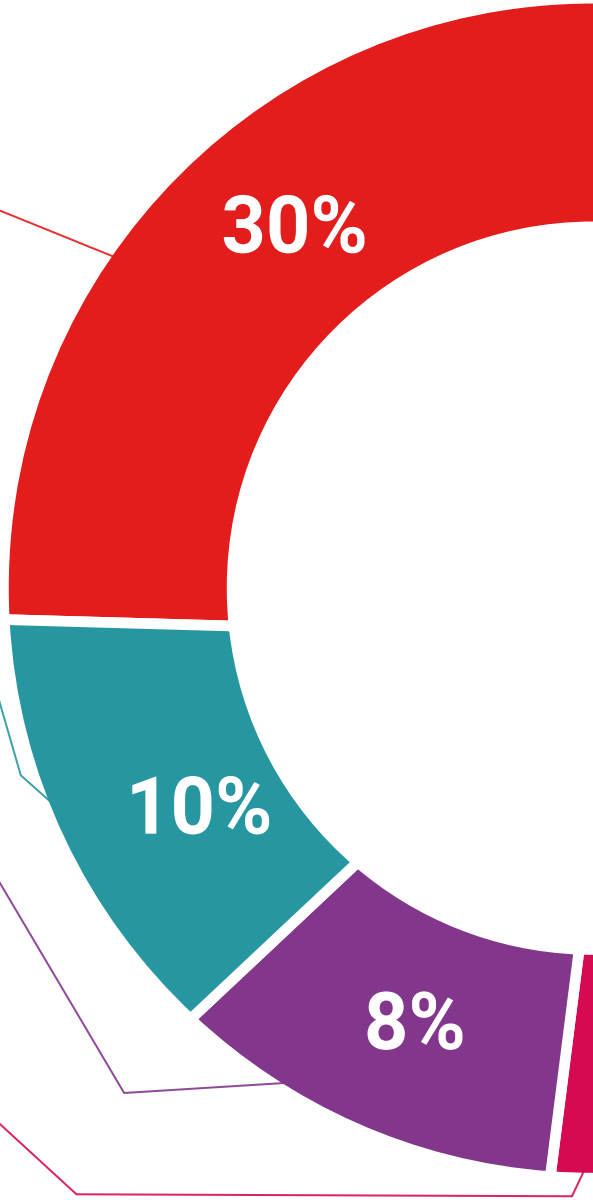
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

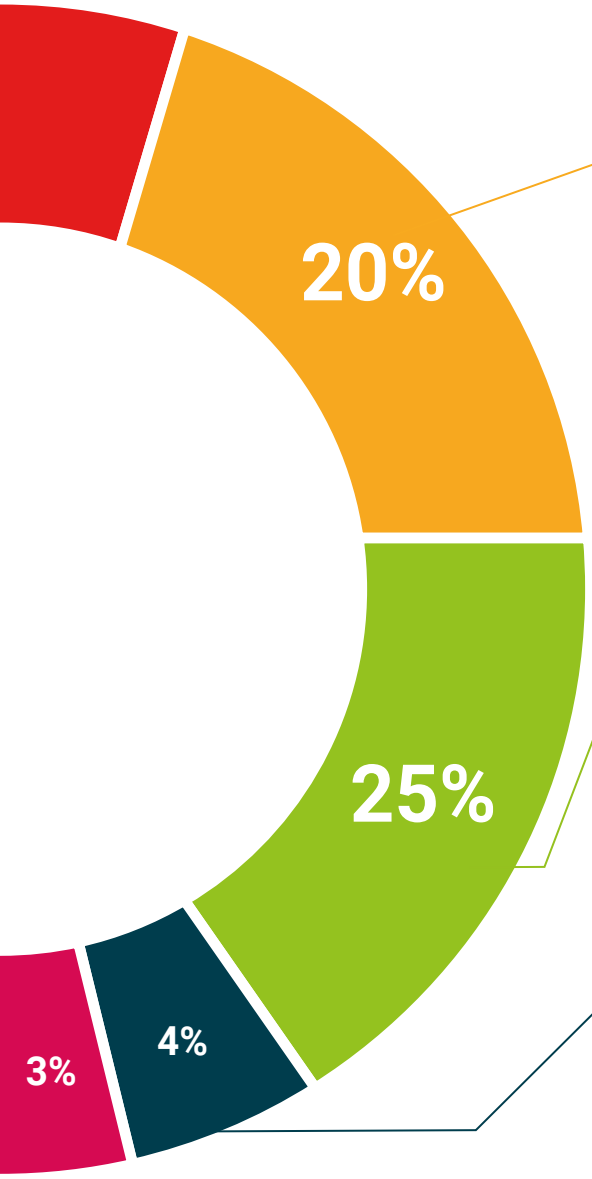
Practising Skills and Abilities

They will carry out activities to develop specific competencies and skills in each thematic area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization we live in.

Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.





Case Studies

They will complete a selection of the best case studies in the field used at Harvard. Cases that are presented, analyzed, and supervised by the best senior management specialists in the world.

Interactive Summaries

The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive multimedia content presentation training Exclusive system was awarded by Microsoft as a "European Success Story".

Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises: so that they can see how they are achieving your goals.

06

Certificate

The Postgraduate Certificate in Distributed Parallel Systems guarantees you, in addition to the most rigorous and updated training, access to a Postgraduate Certificate issued by TECH Technological University.

Successfully complete this training and receive your university degree without travel or laborious paperwork”

This **Postgraduate Certificate in Parallel Performance** contains the most complete and updated program on the market.

After the student has passed the evaluations, they will receive their corresponding **Postgraduate Certificate** issued by **TECH Technological University** by tracked delivery *.

The certificate issued by **TECH Technological University** will reflect the qualification obtained though the Postgraduate Certificate, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Postgraduate Certificate in Parallel Performance**

Official Nº of hours: **150 h.**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Awards the following

CERTIFICATE

to

Mr./Ms. _____, with identification number _____.

For having passed and accredited the following program

POSTGRADUATE CERTIFICATE

in

Parallel Performance

This is a qualification awarded by this University, equivalent to 150 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH is a Private Institution of Higher Education recognized by the Ministry of Public Education as of June 28, 2018.

June 17, 2020

Tere Guevara Navarro

Dean

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country. Unique TECH Code: AFWORD23S techtitute.com/certificates

*Apostille Convention. In the event that the student wishes to have their paper certificate issued with an apostille, TECH EDUCATION will make the necessary arrangements to obtain it, at an additional cost.

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