



PFE BOOK 2022-2023

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who we are



Capgemini is a multicultural company of **340,000 people** in nearly **50 countries**, who work with **world-renowned clients** to find solutions to their most demanding challenges. As a global leader in consulting, digital transformation, technology and engineering services – with unrivaled sectorial expertise – we enable our clients to **design and build tomorrow's businesses**, make the most of the opportunities offered by technology, and **boost their competitiveness and agility**.

OUR PURPOSE

Unleashing human energy through
technology for an inclusive and
sustainable future

For the Capgemini Group, technology promises
progress.

"Capgemini has a key role to play in ensuring that the future lives up to all its promises. We believe that all technologies can enable progress for everyone if, first and foremost, they are designed by and for humans. As a responsible company, the Group is realistic when it comes to the promises as well as the risks of technological innovation: our role is to make it useful, accessible and ethical. This purpose must act as a compass for each and every employee."

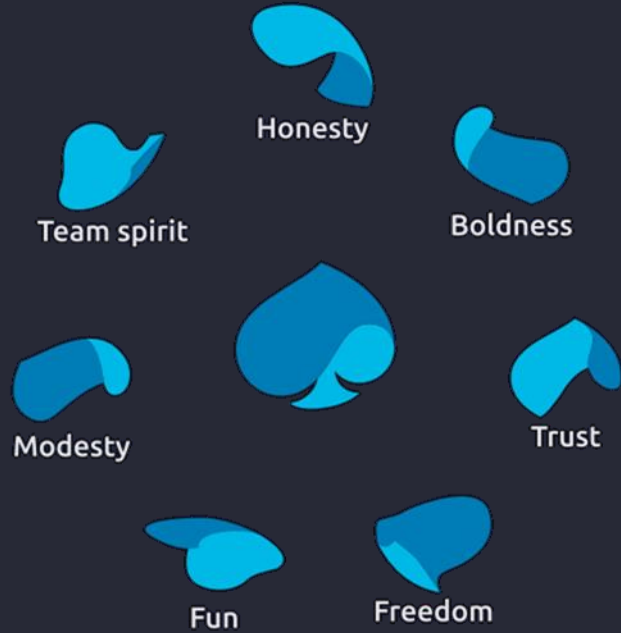
Paul Hermelin, Chairman of the Board, and
Aïman Ezzat, Chief Executive Officer of Capgemini



Our brand promise captures the spirit of our people, committed to bringing to life our purpose of unleashing human energy through technology for a sustainable and inclusive future. We want our teams, our clients, our partners, and our communities to feel that change can happen the way they want it to and that we will help them achieve it.

OUR VALUES

our 7 values



at the heart of everything we do



OUR STORY

For more than 50 years, **we've been a dedicated partner to organizations** around the world, helping them transform and manage their businesses.

A diverse collective of over 340,000 strategic and technological experts across more than 50 countries, we are all driven by one shared passion: to unleash human energy through technology.

As we leverage cloud, data, AI, connectivity, software, digital engineering, and platforms to address the entire breadth of business needs, this passion drives a powerful commitment. To unlock the true value of technology for your business, our planet, and society **for a more inclusive, sustainable future.**

<https://capgemini-engineering.com/nl/en/about-us/overview/>

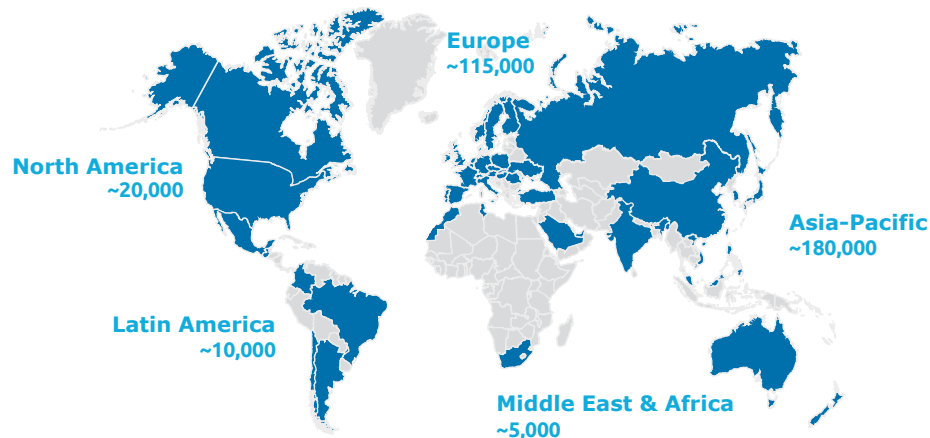
Over
€18 BN
in revenues in 2021
with an operating
margin of 12.9%

Over
340,000
people

More than
50
countries with
more than
120 nationalities



Strong international footprint





A COMPLETE RANGE OF BUSINESSES



We are passionate about helping our clients solve their most complex business and technology challenges, and we deliver transformational outcomes at scale.

We are driven by the conviction that the business value of technology comes from and through people.

As a global leader in consulting, technology services and digital transformation, Capgemini is at the forefront of innovation to address the entire breadth of clients' opportunities in the evolving world of cloud, digital and platforms.

The Capgemini Group's core offer is supported by three specialized sub-brands that enable a full suite of end-to-end solutions for our clients.



Capgemini Invent is the Group's digital innovation, consulting and transformation brand. They bring to life what's next for their clients by combining strategy, technology, data science and creative design expertise.



Sogeti works closely with its clients at a local level and mobilizes expert teams that create custom solutions from existing and emerging technologies to deliver viable outcomes at speed.



Capgemini Engineering combines, under one brand, the world leading engineering and R&D services of Altran – acquired by Capgemini in 2020 – and Capgemini's digital manufacturing expertise. It helps its clients unleash the potential of R&D, a key component of accelerating their journey towards Intelligent Industry.

Industries



AERONAUTICS



AUTOMOTIVE



COMMUNICATIONS



ENERGY



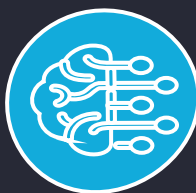
**INDUSTRIAL
& CONSUMER**



LIFESCIENCES



**RAILWAY, INFRASTRUCTURE &
TRANSPORTATION**



**SEMICONDUCTOR &
ELECTRONICS**



**SOFTWARE &
INTERNET**



**SPACE, DEFENSE &
NAVAL**



WE EXPLORE THE FUTURE OF INDUSTRIES WITH 6 R&I PROGRAMS

Our R&I programs are business accelerators that help clients with high-intensity R&D to prove out the value of incremental and disruptive technologies by pioneering engagements built around recognizable assets. Clients go further, faster and to places they would not necessarily go alone.



Future of mobility

Accelerate the future of flight, multi-modal transport, shared mobility and last mile logistics by realizing the vision of safer, collaborative and autonomous vehicles for sustainable urban super cities.



Future of networks & compute

Eliminate the constraints on compute, network and storage for the next generation of immersive experiences and look forward to the final frontier of the space economy.



Future of healthcare

Develop technology platforms for pharmacogenomics, digital therapeutics and predictive medicine that revolutionize the way we cure & treat disease by considering variability in genes, lifestyles and response to therapies.



Future of industry

Capture the benefits of sensing, connectivity and decision making on the edge to boost productivity and revenue growth across every industry.



Future of engineering

Disrupt the way we innovate on products and protect the planet by taking into account parameter complexity, autonomous systems, everything-as-a-service & systems of systems.



Applied AI

Thoughtfully apply data science and machine learning technologies to scale industry-specific problems in precision medicine, autonomous systems, aerospace simulations and industrial automation.



PFE TOPICS





HELPDESK APPLICATION

PROJECT DESCRIPTION

This application will be used to:

- Make available the various templates (Handover, departure, telework...)
- Ensure the management of these templates
- Put in place all the processes of the various requests

PROFILES: ENGINEER



1 or 2 Trainees



IT/ Software engineering



6 months



BackEnd: Framework Spring Boot, Java, maven
FrontEnd: Angular Js



Reporting : PowerBI, Ad Hoc , Talend
DB : MySQL



DEEP LEARNING IN THE AUTOMOTIVE INDUSTRY

PROJECT DESCRIPTION

- The goal here is to empower the Convolutional Neural Networks (CNNs) to receive real-time inputs from the environment and enable them to provide 'outputs' without any 'errors'
- This process is iterative and intense. CNN consumes Petabytes and more worth of data in order to achieve acceptable levels of predictive decisions (predict if the car will be bought or not)

PROFILES: ENGINEER



1 Trainee



Data Science, Business Intelligence, Mathematica Modeling (ESPRIT, ENIT, ISI, FST, ENSI)



1 month/ 2 months / 4months / 6 months



Python, PyCharm, Machine Learning, Data science, Modélisation mathématique, Data Analytics,



DB : SQL/NoSQL



OFFERS RECOMMENDATIONS FOR NEARBY CAR DRIVERS

PROJECT DESCRIPTION

- Allow signup and verify users offering services (Shops, Food, Services...) and permit them to list offers
- Allow users/vehicle drivers to signup and choose which type of services they want to receive when they are driving. They can choose which type of notifications they want to receive audio/push text notification
- Recommend and push offers notifications to interested users within the chosen (buy buyer or seller) area (example: users \leq 500 meters nearby) using device localization and map APIs
- Processing fast orders, rating, and users classifications (example: most ordered categories, how often a user passes nearby an area X ...)

PROFILES: ENGINEER

Mission PT1



1 or 2 Trainees



Computer Science/ BI (ESPRIT, ENIT, ISAMM)



6 months



Angular/ETL/ Reporting



OFFERS RECOMMENDATIONS FOR NEARBY CAR DRIVERS

PROFILES: ENGINEER

Mission PT2



1 Trainee



Computer Science/
Mobile (ESPRIT, ENIT,
ISAMM)



6 months



Android
Mobile
Development

PROFILES: ENGINEER

Mission PT3



2 Trainees



Computer Science/ BI
(ESPRIT, ENIT,
ISAMM)



6 months



Java/spring boot/
relational dbs/ APIs/ R
or python for
classification &
recommendation

Mission: design the
graphic identity of the app



1 Trainee



Multimedia (ISAMM)



6 months



Illustrations/logo
design/ mobile
interface design

EXTERIOR LIGHTING SYSTEM PROTOTYPE FOR A CAR



PROJECT DESCRIPTION

This lighting system must:

- Illuminate the surroundings of the car to carry out outdoor activities at night like camping, working, etc.
- Turn on the vehicle so you can see it from a distance, if needed (improving visibility while driving in rain and fog)
- Possibility of control using a mobile phone via Bluetooth
- Completely powered by a 12V car battery
- Use communication protocols (CAN, LIN) which are current standards in the automotive industry

PROFILES: ENGINEER



2 Trainees



Electrical Engineering, Telecommunications, Embedded Computing, Microelectronics (ENIT, ENISO, ENIM, ENIG, ENIS)



6 months



C, Python, CANalyzer, IHM, CAN, LIN, drivers, Cross compilation, Arduino, STM32, ESP32, MCP2515



STUDY, DESIGN AND PRODUCTION OF THE BMS FOR A 24V LITHIUM-ION BATTERY

PROJECT DESCRIPTION

This system must ensure at least:

- Overvoltage protection
- A temperature measurement
- A personalized setting

PROFILES: ENGINEER



2 Trainees



Electrical Engineering, Telecommunications, Embedded Computing, Microelectronics (ENIT, ENISO, ENIM, ENIG, ENIS)



6 months



C, Kicad, Altium Designer, STM32, STM32CubeIDE

STUDY AND DEVELOPMENT OF AN ELECTROMAGNETIC SIMULATOR FOR LITHIUM-ION BATTERIES OF AN ELECTRIC VEHICLE

PROJECT DESCRIPTION

This project meets the following objectives:

- Develop an electromagnetic simulator on a lithium-ion battery based on several parameters such as:
 - Battery charging and discharging phases
 - The effect of signals around the battery depending on the type of signal: analog/digital and wired/wireless signal
 - The different vehicle states (on, off, etc.)
 - The transmission frequency (High frequency, Low frequency)
 - The Type of voltage (High voltage, Low voltage)

PROFILES: ENGINEER



2 Trainees



Electrical Engineering, Telecommunications, Embedded Computing, Microelectronics (ENIT, ENISO, ENIM, ENIG, ENIS)



6 months



C, C++, Python, MATLAB - Simulink

STUDY AND ANALYSIS OF FAST AND ULTRA-FAST CHARGING TECHNIQUES FOR ELECTRIC VEHICLES

PROJECT DESCRIPTION

This project meets the following objectives:

- State of the art on the different technologies used for fast and ultra-fast charging
- Analysis of fast and ultra-fast charging techniques used in electric vehicles
- Propose improvements at several levels:
 - From the point of view of Efficiency of technology used (System performance)
 - From the Energy Quality point of view delivered (Pollution of the electrical network if it exists and these impacts on the other floors)
 - -From a system security point of view (risk study)
- Develop MATLAB - Simulink models to test and compare old and new results.

PROFILES: ENGINEER



2 Trainees



Electrical Engineering, Telecommunications, Embedded Computing, Microelectronics (ENIT, ENISO, ENIM, ENIG, ENIS)



6 months



C, C++, Python, Altium Designer, Proteus, MATLAB & Simulink

PROOF OF CONCEPT (PROTOTYPE) OF A V2V COMMUNICATION SOLUTIONS / V2V NETWORK

PROJECT DESCRIPTION

To establish a large, consistent, and sustainable Vehicles network, it is recommended to have a secure, manageable and useful *V2V communication, regarding the huge advantage we can monitor the ascending number of vehicles to prevent traffic, enhance drivers' experience, and most of all to collect consistent data that will allow seeing vehicles interfering in solving problems.

*V2V : vehicle to vehicle

PROFILES: ENGINEER



3 Trainees



Electronics, Embedded software technology, Web development



6 months



- PCB design, CAD design, hardware design, solidworks, Catia,
- Python, C, C++, Django, interface design, IOT
- Lora, RF communication C, C++, Embedded software design, IOT



DEVELOPMENT OF A BI SOLUTION BASED ON MACHINE LEARNING TECHNOLOGIES

PROJECT DESCRIPTION

This solution must:

- Scrapping and collecting data from social media and review sites to monitor and analyze Capgemini Engineering's reputation in Tunisia
- Automatic classification of results
- Development of a Dashboard that helps decision-making using Machine Learning techniques

PROFILES: ENGINEER



1 Trainee



Data Science, Business Intelligence, Digital Marketing (Esprit, Université Paris Dauphine Tunis, ENSI)



6 months



Python, Churn Analysis, Machine Learning, BI, Data Analytics, Power BI, PostgreSQL

DESIGN OF A 120W USB PD EXTERNAL POWER SUPPLY



PROJECT DESCRIPTION

- Provide 5 different power levels (5V/3A - 9V/3A - 15V/3A - 20V/5A - 28V/4.2A)
- Have an efficiency >90% at full load at 230V AC
- Have output over-voltage and over-current protection
- Consuming <75mW in IDLE

PROFILES: ENGINEER



2 Trainees



Electrical Engineering, Automation, Microelectronics(ENIT, ENISO, ENIM, ENIG, ENIS, ENIGA)



6 months



Electronics, Automation, Electrical systems, PSPICE, PSIM, LTSPICE, CAD (Altium, Eagle, Proteus...)



DESIGN AND DEVELOPMENT OF A SYSTEM IMAGE THROUGH YOCTO RUNNING ON THE RASPBERRY PI PLATFORM AND PROVIDE THE SDK TO INTEGRATE AN APPLICATION WITH QT

PROJECT DESCRIPTION

Development of a production environment for a system image (with Yocto) for deployment on a Raspberry pi embedded platform. The Work consists in adapting the recipe (Yocto recipes) for Linux image production and the generation of the SDK (Software Development Kit) to integrate a graphical interface application (In QT) for LCD display.

PROFILES: ENGINEER



2 Trainees



Electrical Engineering, Telecommunications, Mechatronics, Embedded Computing(ENIT, ENISO, ENICAR, ENIM, ENIS)



6 months



C, C++, Bash/shell, Yocto, QT, git, drivers, Cross compilation, Raspberry Pi,

STUDY AND DESIGN OF AN INTELLIGENT CHARGER FOR LITHIUM-ION BATTERY

PROJECT DESCRIPTION

This Charger system must:

- Lithium-ion battery charging (the charger must be compatible with the AC 220V network)
- Battery monitoring during charging (Instant current measurement, battery voltage and temperature)
- Measurement and Calculation of SOC and SOH and display on an LCD screen
- Automatic battery detection and isolation when charging operation completes
- Charger control using a cell phone via Bluetooth
- IOT app for charger

PROFILES: ENGINEER



2 Trainees



Electrical engineering, power electronics



6 months



STM32, ESP32, Electronique de puissance, Altium Designer, LTspice



AUTOSAR CAN/ ETHERNET HYBRID GATEWAY USING SOME/IP (SCALABLE SERVICE-ORIENTED MIDDLEWARE OVER IP)

PROJECT DESCRIPTION

The project consists of setting up an exchange data between CAN and Ethernet. It consists of a mapping between signal-based communication and service-based communication.

PROFILES: ENGINEER



1 Trainee



Electrical Engineering, Telecommunications, Embedded Computing, Microelectronics (ESPRIT, ENIT, ENETCOM, ENSI, ENIS, ENISO)



6 months



AUTOSAR, SOME/IP, CAN, Gateway, C



GRAPHICS SHARING BETWEEN ANDROID DEVICE AND RASPBERRY PI MODULE THROUGH BLUETOOTH

PROJECT DESCRIPTION

The purpose of this project is to create an app that would be able to communicate with a Raspberry Pi module through Bluetooth.

PROFILES: ENGINEER



1 Trainee



Electrical Engineering, Telecommunications, Embedded Computing, Microelectronics (ESPRIT, ENIT, ENETCOM, ENSI, ENISO)



6 months



C, Java, Android Linux, Raspberry Pi running Raspbian, Bluetooth Communication, Linux



INSTALLATION OF A MOBILE RADAR ROBOT

PROJECT DESCRIPTION

Design and implement a mobile Radar system for the detection of traffic violations.

PROFILES: ENGINEER



2 Trainees



Telecommunications, Embedded Computing, Microelectronics (ENIT, ENISO, ENIM, ENIG, ENIS)



6 months



C, Python, Java, IHM, CAN, LIN, drivers, Raspberry, Arduino, STM32

DESIGN AND IMPLEMENTATION OF A MERCHANDISE RECOGNITION MODULE

PROJECT DESCRIPTION

Design and implement a merchandise purchasing system installed on a cart.

PROFILES: ENGINEER



2 Trainees



Electrical Engineering, Telecommunications, Embedded Computing, Microelectronics (ENIT, ENISO, ENIM, ENIG, ENIS)



6 months



C, Python, Java, IHM, CAN, LIN, drivers, Raspberry, Arduino, STM32

ROLL-UP PAGE SCANNING SYSTEM PROTOTYPE

PROJECT DESCRIPTION

This scanning system must:

- Allow capturing any type of surface (paper, wall, mirror, etc...) via a manual passage of a connected roller
- Transfer the capture in real-time to an external system (Android phone application, web application)
- Possibility of communication with the Android application via Bluetooth, or Ethernet

PROFILES: ENGINEER



2 Trainees



Electrical Engineering, Telecommunications, Embedded Computing, Microelectronics (ENIT, ENISO, ENIM, ENIG, ENIS)



6 months



C, Python, Java, IHM, CAN, LIN, drivers, Raspberry, Arduino, STM32



DEVELOPMENT OF AN AUTOMATED "MATCHING" SYSTEM BETWEEN CV AND JOB OFFERS (LOT2)

PROJECT DESCRIPTION

In order to manage the flow of CVs received on the one hand and specific requests from clients for consultants on the other hand, Capgemini Tunisia offers a pre-hiring PFE entitled:

Development of lot 2 of an automated matching system between CVs and job offers

PROFILES: ENGINEER/TECHNICIAN



2 Trainees



Computer Science IT/ IA/ (ESSAI, ENIG, ENSI, ENSIT, ENIT)



6 months



- IA, Data Science, Kotlin ou Java ; SQL;
- ElasticSearch; Git; GitHub; Api Rest (Open Api 3.0 / Swagger 3.0)





DEVELOPMENT AND DESIGN OF A PLATFORM FOR THE DISSEMINATION OF EVENTS (TRAINING, COMMUNICATIONS, OTHER) ORGANIZED WITHIN CAPGEMINI

PROJECT DESCRIPTION

This application allows to:

- Upload all videos related to Capgemini events in the cloud/dedicated server
- Adjust video playback in a custom player
- Create a custom library
- Search for videos (training, events, others) by several criteria

PROFILES: ENGINEER



1 Trainee



Computer Engineering



6 months



Angular 11+, nodeJS, Spring, Css3, HTML5

SHARING KNOWLEDGE PLATFORM

Develop an in-house solution for Capgemini consultants

PROJECT DESCRIPTION

- Solving similar errors between consultants. Speed up the solving of the problems
- Publish errors/solutions related to the shared topics of the projects
- Share knowledge (links/labs/articles) like a filter to the best articles/most used articles from next
- Give feedback/solutions/labs to facilitate the earning of the certificates. Share knowledge
- Give bonuses/votes to consultants who contribute to the topic/topics published
- Publish useful snippets of codes (classes of logs, configs, recommendations)
- Best practices

PROFILES: ENGINEER/TECHNICIAN



2 Trainees



IT (ENIG, ENSI, ENSIT, ENIT, TBS, ISG, IHEC)



6 months



Python, Django, java, react native, angular, JavaScript



DESIGN AND IMPLEMENTATION OF A DOCUMENT MANAGEMENT SYSTEM

PROJECT DESCRIPTION

This document management system allows:

- Document processing
- Archiving and version management of documents
- Profile management must be provided by this system
- Import and export of documents after processing

PROFILES: ENGINEER



1 Trainee



Computer Science, Software Engineering



6 months



PHP, Angular, Sql, Bootstrap, TypeScript



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HUMAN RESOURCE MANAGEMENT APPLICATION

PROJECT DESCRIPTION

Develop a human resources application allowing the management of all Capgemini employees.

PROFILES: ENGINEER



2 Trainees



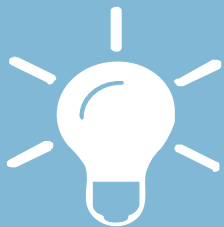
Computer Engineering



6 months



Apache Tomcat, Java, Jasper, Spring, Hibernate, Oracle, Angular, BootStrap, Git



WHY CHOOSE US ?

1

› **Deep industry expertise**

2

› **End-to-End offerings to pioneer Intelligent Industry**

3

› **Strategic transformation partner of the Innovation leaders**

4

› **Unmatched portfolio in Digital & Software**

5

› **Industrialized Globalshore®**





TESTIMONIALS

What our colleagues say about
Capgemini Engineering!

Mawaheb, Consultant Engineer

“What I’ve learned from my experience in Capgemini is: the basics of teamwork; how to collaborate to succeed, and the importance of a positive environment based on the best work conditions.”



Mourad, Electronics Engineer

“My experience at Capgemini dates from the beginning of its presence in Tunisia. We work mainly for large-caliber European customers in the field of electric cars: we contribute to the development of the latest generation vehicles, which makes me very proud to belong to such a Group.”



Olfa, Consultant Engineer

“There is a great focus on developing and using my strengths to achieve the best results. I am also able to do my job without any pressure thanks to the trust given to me by my managers”





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About Capgemini Engineering

World leader in engineering and R&D services, Capgemini Engineering combines its broad industry knowledge and cutting-edge technologies in digital and software to support the convergence of the physical and digital worlds. Coupled with the capabilities of the rest of the Group, it helps clients to accelerate their journey towards Intelligent Industry. Capgemini Engineering has more than 55,000 engineer and scientist team members in over 30 countries across sectors including Aeronautics, Space, Defense, Naval, Automotive, Rail, Infrastructure & Transportation, Energy, Utilities & Chemicals, Life Sciences, Communications, Semiconductor & Electronics, Industrial & Consumer, Software & Internet.

Capgemini Engineering is an integral part of the Capgemini Group, a global leader in partnering with companies to transform and manage their business by harnessing the power of technology. The Group is guided every day by its purpose of unleashing human energy through technology for an inclusive and sustainable future. It is a responsible and diverse organization of over 340,000 team members in more than 50 countries. With its strong 55-year heritage and deep industry expertise, Capgemini is trusted by its clients to address the entire breadth of their business needs, from strategy and design to operations, fueled by the fast evolving and innovative world of cloud, data, AI, connectivity, software, digital engineering and platforms. The Group reported in 2021 global revenues of €18 billion.

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