



THE UNIVERSITY OF  
**AUCKLAND**  
Te Whare Wānanga o Tamaki Makaurau  
NEW ZEALAND

DEPARTMENT OF ELECTRICAL, COMPUTER,  
AND SOFTWARE ENGINEERING

2024 - Part IV Research Project: Introduction

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### Part IV Project Coordination Team:

- Associate Professor **Morteza Biglari-Abhari** (Main Coordinator)  
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- Technical Manager: Sunita Bhide      email: [s.bhide@auckland.ac.nz](mailto:s.bhide@auckland.ac.nz)
- For project specific enquires: **Email your supervisor**
- For general enquires: Email us (Subject: P4P)
- **Read all emails and Canvas notices** (this is the student's responsibility)

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### **Part IV Research Project:**

The purpose of doing Part IV Research Project is **to develop research skills** through preparing a **Research Portfolio**.

- **Emphasis on Research (not design or development)**
- **Students undertake research in pairs on a topic approved by the Department**
- **Students are assessed individually**

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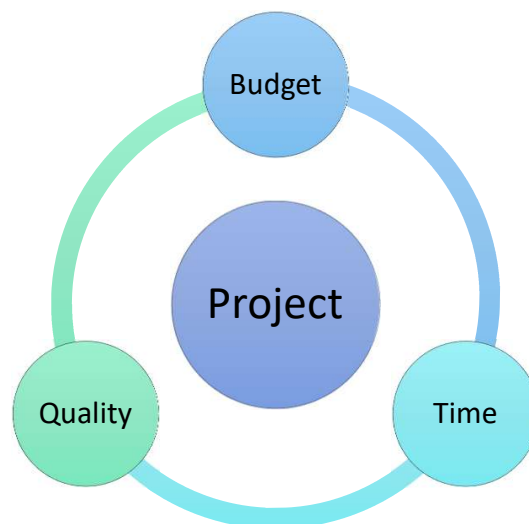
### **What is Research?**

- ❖ The purpose of research is to enhance society by advancing knowledge through scientific theories, concepts and ideas.
- ❖ A research purpose is met through forming hypotheses, collecting data, analyzing, etc.
- ❖ A good research involves systematic planning and setting time-based, realistic objectives.
- ❖ It entails feasible research methods based upon a research methodology that best suits the nature of your research question.
- ❖ It is built upon sufficient relevant data and is reproducible and replicable.

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## What is a Project?

- Project is a temporary process undertaken to create a unique product or service, with a **target goal**.
- A project has three features, which should be clearly defined:



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## Research Portfolio

- ✓ Literature Review and Research Intent
- ✓ Progress Report and Research Presentation (*Seminar and Poster*)
- ✓ Research Final Report
- ✓ Research Compendium

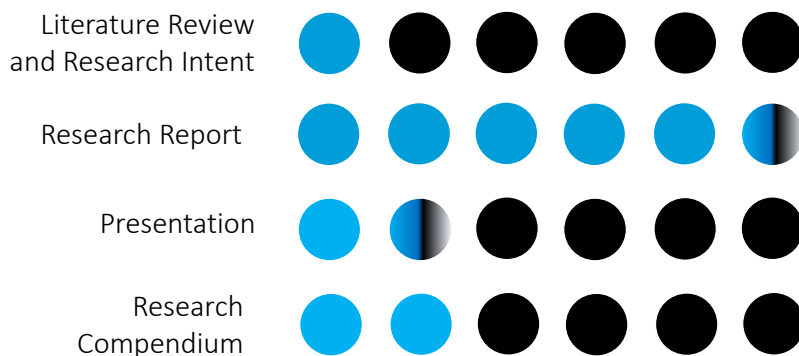
Some components of this portfolio are **compulsory** (as research in real-world encompass these items) and must be submitted or delivered.

- ❖ Research Portfolio assists you to develop good research report and demonstrate how the research goals have been achieved.
- ❖ **The assessment is 100% based on the Final Report.**

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## **How to balance your effort?**

### **A General Guide Only ...**



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## What effort is required?



All students are expected to spend, on average, about 10 hours per week throughout the duration of Research Project



You should meet your supervisor on a weekly basis (or as required by your supervisor) – this is a good way to receive constant feedback on your progress



Work as a team and share the workload



If you intend to work in the labs, you must complete Lab Safety Induction first, which includes attending an in-person session before swipe card access to the labs can be granted – so be sure to complete this as early as possible

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## Arrangements for Research Lab Access

- Each Part IV project group will be assigned a workstation in research Labs.

**To get access to any Research Lab, you will need to undergo ECSE Health & Safety Induction, which is compulsory and includes the following:**

- Online induction and quiz
- In-person lab induction
- Risk Assessment document

*In Week 2, we will be adding all Part IV students to the Health & Safety online induction course in Canvas. You will receive a separate email once this is done.*

Please complete online induction and quiz and then book and attend an in-person lab induction. (A link will be provided in Canvas to book the in-person session).

- *In-person inductions will begin from Week 2 onwards.*

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## P4P Components and Key Dates:

P4P Component	Type	Date
Project Scope, Research Objectives, & Literature Review (Draft for Final Report)	Highly Recommended / Non Compulsory (individual submission / feedback will be provided)	Friday, 26 April 2024 5:00 pm
Mid-Year Progress Report	Highly Recommended / Non Compulsory (individual submission / feedback will be provided)	Friday, 19 July 2024 5:00 pm
Conference Presentation (Early Seminar Day)	Compulsory (participation in event)	Saturday, 20 July 2024
P4P Display Day (Exhibition Day) Poster	Compulsory Presentation Deliverable of P4P Display Day (joint submission)	Friday, 4 Oct 2024 5:00 pm
Final Research Report	Assessed / Compulsory (100% of grade) (individual submission)	Friday, 11 Oct 2024 5:00 pm (consistent date and time across all departments)
Research Compendium	Compulsory (joint submission)	Monday, 14 Oct 2024 5:00 pm (consistent date and time across all departments)
P4P Display (Exhibition) Day	Compulsory (participation in event)	Thursday, 17 Oct 2024 (consistent date across all departments)

**All deliverables must be submitted through Canvas.**

**Note:** All reports are subject to a plagiarism check through 'Turnitin'.

**Refer to the Handbook**

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## Developing your Research Portfolio

- Each component of this portfolio should be submitted through Canvas.
- If any of the compulsory components is not submitted or delivered, your grade for the course will be Did Not Complete (**DNC**).

Component	Indicative Weight	Semester
Literature Review and Statement of Research Intent	Highly Recommended	<b>Semester 1</b>
Mid-Year Work Progress Report	Highly Recommended	<b>Semester 2</b>
Mid-Year Seminar	<b>Compulsory</b>	<b>Semester 2</b>
Display Day Poster	<b>Compulsory</b>	<b>Semester 2</b>
Final Report	100%	<b>Semester 2</b>
Display (Exhibition) Day	<b>Compulsory</b>	<b>Semester 2</b>
Research Compendium	<b>Compulsory</b>	<b>Semester 2</b>

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## Research Portfolio: Project Scope, Research Objectives, and Literature Review

- This is not compulsory but **highly recommended**.
- Each student** should submit a report: project scope & objective (1-2 pages) and literature review (5-6 pages) using the given report template.

**A project schedule or plan in the form of a Gantt chart should be included.**

**Should give the reader an idea about:**

The supervisor will return detailed written or verbal feedback on these, with the aim of helping students to improve their writing and research plan.

What you have found out so far

What you intend to do

Why intend to do it

How you intend to do it

What is the significance of doing it

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## **Report Contents:**



Introduction



Literature Review



Research Objectives



Project Scope



Conclusions

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## **Report (Introduction)**

- It should aim to explain what the project/report is about.
- Should include key details about the project that give the reader enough information to understand the purpose and scope of the project.
- Also, good to have a short paragraph on how the remainder of the report is organized.

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## **Report (Literature Review)**

### ***What is literature review?***

- ❖ Finding out the current state of knowledge on a specific topic
- ❖ Many (research) groups across the world quite often work on the same topic
- ❖ This information is published in journal/conference articles, technical reports, theses, books etc.
- ❖ They often discuss several possible ways of working on a research project, the need for it, constraints associated etc.
- ❖ Reading through existing literature builds up the motivation leading up to the project
- ❖ Reviewing literature clearly shows how the project will contribute to advance the knowledge on a specific topic – the 'Research Intent'

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### ***Why is a Literature Review Needed?***

- To make sure that researchers do not duplicate or repeat research (or work) that has already been done and published.
- It is also an opportunity to learn from what is already done to set out the next steps.
- Literature can also provide information where future research is heading, and, also what has not possibly been investigated yet [especially for P4 -> R&D].
- It highlights areas on which researchers can focus on - *rather than repeating what has already been done!*
- It lists key findings (both positive, negative) which helps steer future work.

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## ***Purpose of Literature Review:***



## ***Content of Literature Review:***



Summarize and evaluate the current state of knowledge in the field



Note major themes or topics and the most important trends



Report any findings about which researchers disagree



Discuss research which leads directly to your own research project → Helps you to identify your 'Research Contribution'

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## **Report (Research Objectives)**

**Research objectives describe what we expect to achieve by doing this project:**

When outlining your research objectives:

1. Pinpoint the major focus of your research.
2. Break down your research focus into research objectives.
3. Write your research objectives in the SMART format.
4. Keep your number of objectives limited.
5. Use action verbs.



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## **Report (Project Scope)**

- Project scope is a detailed outline of all aspects of a project
- It should include:
  - All related activities
  - Resources
  - Timelines
  - Deliverables
  - Project's boundaries



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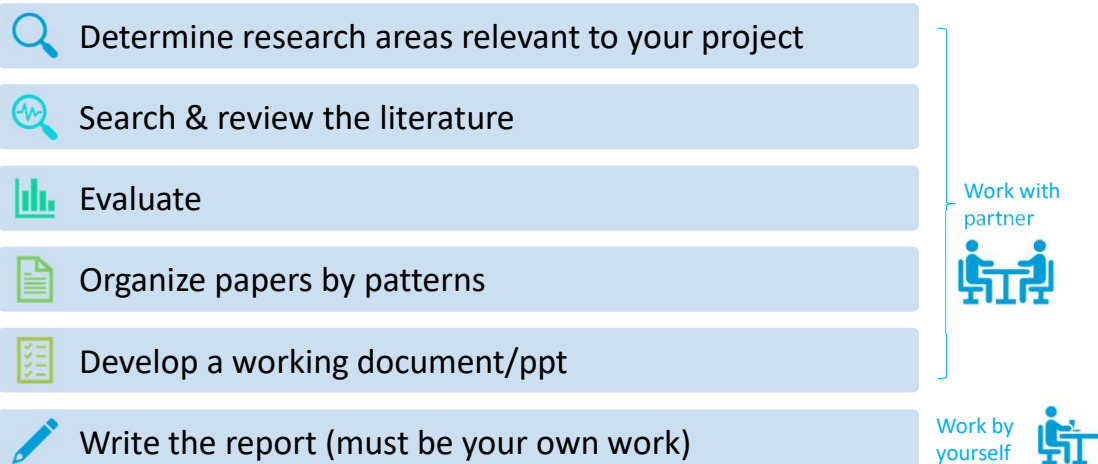
## **Report (Conclusions)**

- Summarize all the evidence presented and discuss about their significance
- Highlight gaps and indicate how previous research leads to your own research project
- Explain why you (the researcher) have selected specific methodology to work on your own research project

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## Steps To Get Prepared (Writing A Literature Review)

### **Helpful tips to structure your report:**



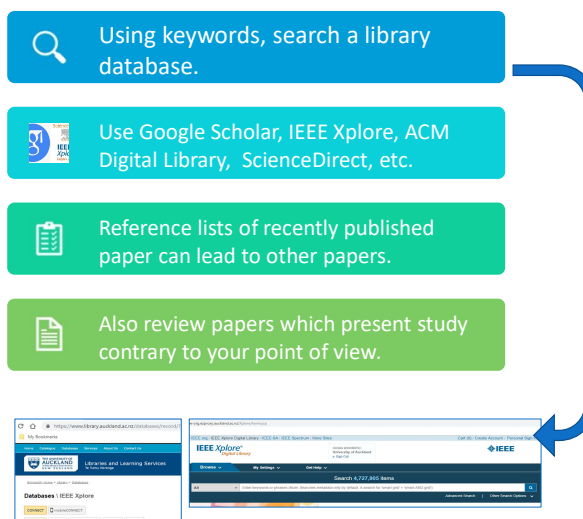
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## **1. Determine Research Areas Relevant to Your Project**



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## 2. Search and Review the Literature



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## 3. Evaluate

- Pay attention to assumptions some researchers make.
- Pay attention to testing procedures and measurement techniques.
- Evaluate research findings.
- Note conflicting theories, results and methodologies.
- Note experts in the research field.
- Check references [papers cited frequently by many researchers is a good indicator of an important work]

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## 4. Organize Papers By Patterns and By Developing Subtopics



Findings that are common and consistent.



Two or three important trends in the research.



The most influential theories.



Most cited paper.



Good practice: store them in common repository, e.g., Google Drive or a Reference Manager like [Mendeley](#) for easy sharing and access.

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## 5. Develop a Working Document



Write one or two paragraphs summarizing the conclusion you have reached on the paper you have read, in your own words.



Also, make one slide, summarizing the paper you've read, citing the paper.



Develop headings/subheadings accordingly to the emerging structure of the evaluated material.

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## 6. Write the Literature Review and Statement of Research Intent



Follow the plan you have developed in early stage, making sure that each section links logically to the one before and after.



Arrange your sections by themes or subtopics, not by reporting the work of individual theorists or researchers.



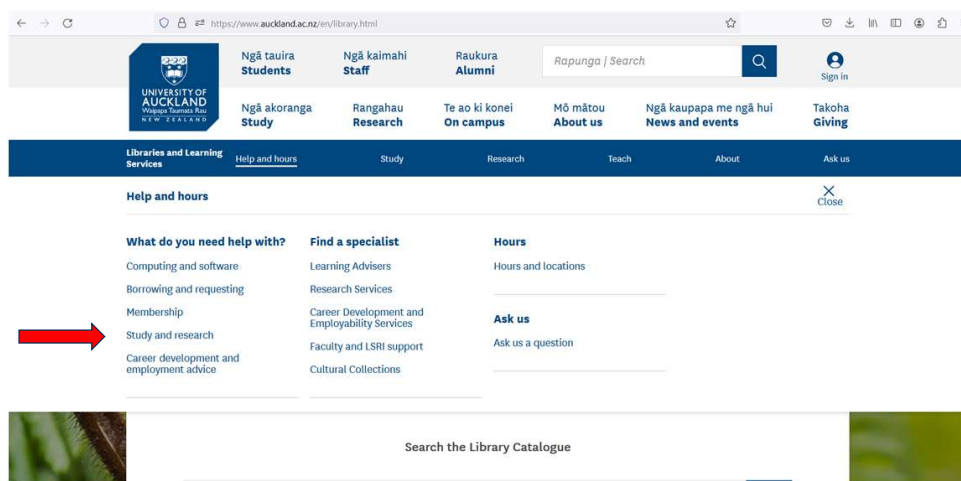
Remember that in your future Project Report you will be extensively referring to your Literature Review and Statement of Research Intent.



Research Intent: Specify your research contribution target, quantitatively and qualitatively, based on your literature review, which you'll try to achieve in the project.

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## Part IV Research Library Support:



Some library related materials are available on Canvas.

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## Library Supports

- Library has some new online resource, specifically designed for Engineering students, is Engineering Study and Research Skills Hub.
- Accessible through [Academic skills in your discipline | Learning essentials \(auckland.ac.nz\)](https://learningessentials.auckland.ac.nz/) by anyone with the university login.
- Modules for Referencing and Finding Information which are highly recommended.
  - Finding Information: <https://learningessentials.auckland.ac.nz/finding-information/>
  - Referencing: <https://learningessentials.auckland.ac.nz/referencing/>
- Following link takes you to the user guide for RefWorks: [https://knowledge.exlibrisgroup.com/RefWorks/Product\\_Documentation/RefWorks User Guide](https://knowledge.exlibrisgroup.com/RefWorks/Product_Documentation/RefWorks_User_Guide)

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## Library Workshops:



### Referencing

[https://www.library.auckland.ac.nz/workshops/index.php?p=view\\_workshop&id=2597](https://www.library.auckland.ac.nz/workshops/index.php?p=view_workshop&id=2597)



### Finding Information – The Basics

[https://www.library.auckland.ac.nz/workshops/index.php?p=view\\_workshop&id=2595](https://www.library.auckland.ac.nz/workshops/index.php?p=view_workshop&id=2595)



### Finding Information – Literature Review

[https://www.library.auckland.ac.nz/workshops/index.php?p=view\\_workshop&id=2568](https://www.library.auckland.ac.nz/workshops/index.php?p=view_workshop&id=2568)

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## Other components of the Research Portfolio

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### Deliverables: Mid-Year Progress Report

- This is not compulsory but **highly recommended**.
- **Each student** should submit a short report (up to 6 pages)
- It should contain only technical content (e.g., mathematical formulations, algorithms, designs, analyses, experimental results etc.) and to discuss about the research progress and the major steps to be taken for the rest of the project.
- The purpose is to get further feedback from your supervisor

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## Deliverables: Conference Presentation (Mid-Year or early Seminar)

- This is a compulsory component of the research portfolio.
- Students will be given an opportunity to speak in front of an audience
- How it works:
  - Prepare visual aids such as slides
  - Each team should deliver presentation within **16 min** (5 minutes per student, 5 minutes Q&A, and 1 minute for changeover to next presentation)
  - The seminar will be done in seminar rooms, in front of supervisors/co-supervisor, audience
  - Students will get feedback on their presentation skillset and content delivery
  - Each presentation will be peer reviewed
  - This seminar will help prepare for the exhibition day
  - It will be done in mid-year, as an interim progress check

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## Deliverables: Display Day Poster

- This is a compulsory component of the research portfolio.
- Each team must prepare a summary poster that will be demonstrated and presented during the Display (Exhibition) Day.
- Poster Format:
  - Poster size: A1 (594 x 841mm)
  - Orientation: Portrait only
  - File size: Less than 50Mb
  - File format: PDF only

*You will receive email for further details a few weeks before the deadline.*

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## Deliverables: Final Research Report

- This is the **compulsory component for 100% of the assessment.**
- **Each student** must submit a final research report.
- The final report will typically be **12,000 words in length, and must be no shorter than 8,000 words, and no longer than 13,000 words with no more than a maximum length of 25 pages** (excluding title page, Table of Contents/List of Figures/List of Tables, Abstract, References, and Appendices). The number of words and pages should be counted from the Introduction to the Conclusions section. The expected word count will be lower if figures are included, but **all reports must include at least 8,000 words.**
- The IEEE referencing format should be followed.
- Report needs to be submitted via Canvas, and is subject to a plagiarism check through '[Turnitin](#)' (very important factor!)

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## Deliverables: Research Compendium

- This is a **compulsory** component of the research portfolio.
- All slides and exhibition posters must be included in the research compendium
- Any hardware, software, etc., developed as part of the project will also be regarded as part of the research compendium
- Include all source files of your design and the reports
- Consult with your supervisor for details about the compendium as it is project dependent.

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## **Display (Exhibition) Day:**

- Attendance in the Display (Exhibition) Day **is compulsory.**
- Each Part IV project group will be assigned a workstation in research Labs.
- Two Sessions on the Exhibition Day:
  - Session to present your work to your supervisors
  - Session to present your work to Industry Judges and public

Teams may use their own laptop or lab computer for the project demo in addition to their poster and seminar slides for the presentation.

The total given time for a session is about 20 minutes and typically about half of it is used in less formal and more interactive manner during the demo.

**Note:** To get access to any Research Lab, you will need to undergo **ECSE Health & Safety Induction** as instructed before.

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## Assessment: Rubrics

The passing grade for this course is determined by a written final research report prepared **independently by each student.**

Students are expected to:

1. Show evidence of advanced knowledge about a specialist field of enquiry
2. Demonstrate mastery of sophisticated theoretical subject matter
3. Evaluate critically the findings and discussion in the literature
4. Research, analyse, and reflect on findings
5. Engage in rigorous intellectual analysis, criticism, and problem-solving
6. Demonstrate a high order of skill in the planning, execution, and completion of an original, independent research project
7. Apply research skills appropriately

Detailed rubrics are provided in the P4P handbook

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## Project Budget

- Each project has a maximum fund allocation of \$250 – covers cost of consumables in projects that use hardware.
- In exceptional circumstances, Part IV Project Coordinator(s) may approve expenditure beyond the \$250 limit - considered on a case-by-case basis, and must be negotiated by the project Supervisor
- First check the ECE Component Store:  
<http://share.engineering.auckland.ac.nz/ece/ts/Lists/Stock%20Inventory/Student.aspx>
- If item is not stocked by the ECSE store you should first try the University's standard suppliers – *for example: Element14, RS Components, Jaycar, Digikey and Mouser*  
**(You should check this with your allocated lab technician).**
- You should identify a non-standard supplier if these suppliers are unable to provide either what is required, or a viable alternative.

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## Questions ?



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