



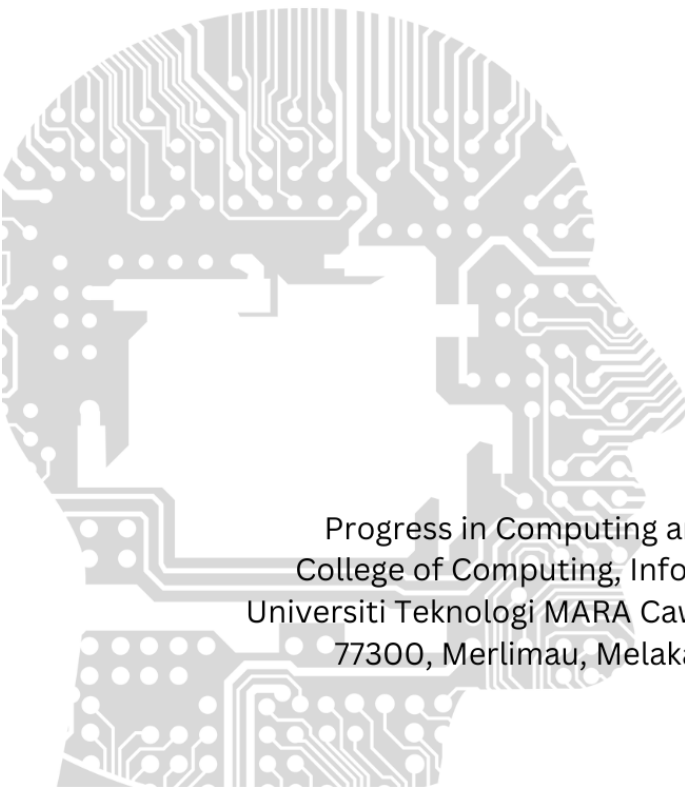
Cawangan Melaka

# PCMJ

Progress in Computing and Mathematics Journal

**volume 1**

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Progress in Computing and Mathematics Journal  
College of Computing, Informatics, and Mathematics  
Universiti Teknologi MARA Cawangan Melaka, Kampus Jasin  
77300, Merlimau, Melaka Bandaraya Bersejarah

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Progress in Computing and Mathematics Journal  
**volume 1**



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Progress in Computing and Mathematics Journal (PCMJ)  
College of Computing, Informatics, and Mathematics  
Universiti Teknologi MARA Cawangan Melaka, Kampus Jasin  
77300, Merlimau, Melaka Bandaraya Bersejarah

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# **PCMJ**

**Progress in Computing and Mathematics Journal**

## **volume 1**

# PREFACE

Welcome to the inaugural volume of the **Progress in Computing and Mathematics Journal (PCMJ)**, a publication proudly presented by the College of Computing, Informatics, and Mathematics at UiTM Cawangan Melaka.

This journal represents a significant step in our commitment to fostering a vibrant research culture, initially providing a crucial platform for our undergraduate students to showcase their intellectual curiosity, dedication to scholarly pursuit, and potential to contribute to the broader academic discourse in the fields of computing and mathematics. However, we envision PCMJ evolving into a beacon for researchers both nationally and internationally. We aspire to cultivate a space where groundbreaking research and innovative ideas converge, fostering collaboration and intellectual exchange among established scholars and emerging talents alike.

The manuscripts featured in this first volume, predominantly authored by our undergraduate students, are a testament to the hard work and dedication of these budding researchers, as well as the guidance and support provided by their faculty mentors. They cover a diverse range of topics, reflecting the breadth and depth of research interests within our college, and set the stage for the high-quality scholarship we aim to attract in future volumes.

As editors, we are honored to have played a role in bringing this journal to fruition. We extend our sincere gratitude to all the authors, reviewers, and members of the editorial board for their invaluable contributions. We also acknowledge the unwavering support of the college administration in making this initiative possible.

We hope that PCMJ will inspire future generations of students and researchers to embrace research and innovation, to push the boundaries of knowledge, and to make their mark on the world of computing and mathematics.

## **Editors**

**Progress in Computing and Mathematics Journal (PCMJ)**  
**College of Computing, Informatics, and Mathematics**  
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## HALAL INTEGRITY INSPECTOR: A GAME-BASED LEARNING APPROACH TO ENSURING HALAL STANDARDS AND COMPLIANCE

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### Article Info

### Abstract

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Project “Halal Integrity Inspector” used game-based learning to solve hurdles. The major difficulty is that non-Halal products repeatedly use the Halal logo without permission. This alarming ability makes Halal products unreliable, causing moral and religious issues. Complex Halal certification for many venues is routinely disregarded. This mechanism is poorly understood, exacerbating mislabelling. Halal Integrity Inspector addresses these issues. This amusing and useful puzzle game teaches people to spot bogus Halal products. Continuous development with agile approaches is more systematic. The agile phases of Planning, Design, Development, Testing, Deploy, and Review enhance development. Final assessment of user engagement using Competence, Immersion, Flow, Tension, Challenge, Negative Affect, and Positive Affect. Total involvement was 68.23%, encouraging. Immersion (88.14%) and Positive Affect (88.69%) showed good connections. Challenge, tension, and negative affect were suggested improvements. This study found that user feedback

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improves game design and immersion. This project concludes with future work proposals. This project can expand with VR/AR This tool helps Halal industry navigation. AI is a fast-growing technology that should be used and trained.

**Keywords:** Halal, Visual Novel, Logo, Agile, Methodology

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## INTRODUCTION

The Halal business is very significant in Islamic society because it imposes the norms of what is allowed and legal, particularly with relation to food and drink. This is especially true when it comes to the Islamic community. This is due to the fact that Muslims are only permitted to consume Halal (permissible) meals and are forbidden from consuming haram (banned) foods according to the dietary laws (Kassim, 2020). However, despite the fact that the industry makes an effort to adhere to these regulations, it continues to face challenges such as fraudulent activities and incorrect labelling, particularly when counterfeit Halal items are introduced into the market. These dishonest practices not only undermine people's trust in one another, but they also put those who are attempting to adhere to their religious beliefs in danger. These issues are made much more difficult by the complexities of the Halal supply chain, which include human resources, processing, transportation, and certification procedures. This further complicates the process of identifying genuine Halal items. It is usually when Muslims seek to identify this category of foods in the market, they typically rely on the printed Halal logo that is present on food packaging (Razak et al., 2019). In light of all of these concerns, actions have been taken to address the issue that is now being faced. These innovative solutions include "The Halal Integrity Inspector" (HII), which is one of them. This programme makes use of the educational and immersive capabilities of computer games in order to provide individuals with



the knowledge and abilities they require in order to navigate the complex Halal business. This can invite several issues regarding of Halal products integrity such as Halal counterfeiting, Halal fraud, Cross-contamination food and many more (Ahianindiasdri & Bergmans, 2021). By placing players in an interactive story about Zain, the main character, as he develops into the great HII, the game intends to educate players about the complexities of Halal certification, the perils of fraud, and how vital it is to adhere to Islamic standards. This will be accomplished by putting players in a story that follows Zain as he grows up to become the HII. Through interactive gaming and instructional features, the Halal business Initiative (HII) aims to equip individuals with the knowledge and skills necessary to differentiate between authentic and counterfeit Halal products. This will enable individuals to maintain their religious convictions and promote integrity within the Halal industry.

## LITERATURE REVIEW

The Halal industry plays a major role because it serves both Muslims and non-Muslims. It does this by following the rules and principles of Islam to make sure that all of its goods and services meet Halal standards. The Halal food industry has been the subject of a lot of study, which shows how big it is and how it works in terms of production, processing, packaging, distribution, and consumption. Food security, especially meat, smooth food processing, and buyer trust in Halal products have affected the Halal chain and industry (Mohd Riza et al., 2022). Goods aimed at Muslim customers around the world must get Halal certification. This is because more and more people, both Muslims and non-Muslims, want Halal products for health reasons, moral reasons, and cultural reasons. Halal branding also can give businesses access to new markets, competitive advantages, and greater prices and profit margins (Ali et al., 2018).

Not only does the Halal business involve food, but it covers cosmetics, drugs, fashion, banking, and tourism. This study looks at how Halal goods and services are used around the world. It covers banking, travel, cosmetics, clothing, and food. It looks at trends and growth paths in the Halal business world by using research that has already been done and fully examining each field. The growing demand for Halal food is shown by the fact that many non-Muslim countries

now have a lot of Halal choices. The study looks into many areas of the Halal industry, such as how goods are made, how people behave, and how culture affects behaviour. It aims to shed light on the reasons why Halal products are becoming more popular among a wide range of groups.

The Halal fashion industry is growing, especially because more people want modest clothes and clothes that were made in an ethical way. This shows how customer tastes and cultural concerns are changing. Also, the growth of Halal cosmetics and drugs is in line with changes in the world's population. This study shows how complex the Halal business is and how it affects global markets, health, ethics, and culture in big ways. It also sparks interest and research around the world.

**As counterfeit logos are used on non-Halal products, the Halal industry faces fraud and mislabelling.**

Halal firms have to deal with the problem of fake Halal certificates being used to sell non-Halal goods. The human resource, processing, logistical, raw material, Halal certification, traceability, market characteristic, outsourcing practices, and product characteristic are the nine key potential risks identified by the study in the Halal food supply chain (Azmi et al., 2020). This causes a lot of problems for both customers and the business itself. A study of the Halal food supply chain finds nine main risks. These are related to people working in the chain, processing, logistics, raw materials, certification, traceability, market characteristics, outsourcing practices, and the type of food being sold. This is as a result of the subjective nature of the term "food fraud," which makes it difficult to evaluate fraudulent acts and the degree of fraud in an impartial manner (Ruslan et al., 2018). This wrong use of the Halal logo causes confusion, especially among Muslim customers, which makes them less likely to trust products that say they are Halal. To solve this problem, The Halal Integrity Inspector video game teaches players how to spot real Halal markings. The problem is made worse by the fact that the certification process isn't honest or accountable. This makes people even less trusting of Halal-certified products. The subjective nature of "food fraud" makes evaluations harder,

especially since educated consumers are more likely to question the accuracy of labels and look for ways to prove them. According to Ismail N, Hoo W, Leong A, Malek F, Siang L, Shya L and Nagaraj S(2021), their research show that Halal awareness and subjective norms have a similar effect on purchase intent, while the Halal logo are not strong indicators. The HII gives players an immersive and interactive experience that helps them tell the difference between real and fake Halal logos, learn about the health effects of eating Halal-certified foods, and learn how to make smart decisions. The HII wants to lower the risk of fraud in the Halal industry by giving people the information and tools they need to protect themselves from being lied to. Research suggests that consumers with higher levels of education are more likely to doubt the accuracy of the information on food labels and have been more willing to use a device to validate what is written (Charlebois et al., 2016).

### **Neglect of the Halal industry leads to public misunderstanding of the certification process.**

There are fast food restaurants, raw materials and ingredients, poultry, meat, and dairy products in the Halal industry. The Halal industry includes fast food restaurants, raw materials and ingredients, poultry, meat, and dairy products, as well as a comparison of the Halal business's pharmaceutical, cosmetics, and healthcare sectors (Ab Rashid & Bojei, 2020). There is also a comparison of the Halal business's pharmaceutical, cosmetics, and healthcare sectors. People don't always follow the certification process for these non-food industries, though, which leaves customers confused and unsure. It's an interesting subject to talk about how Halal medication is needed all around the world given that there are still many medications that are meant to include prohibited (haram) chemicals (Rahem, 2018). Being able to talk about how important Halal medicine is all over the world is interesting, since many medicines still contain chemicals that are considered to be harmful. These items are being sold in the market even though they are fake or have the wrong labels, which has made customers confused and suspicious. In order to help customer preferences towards Halal purchases, Halal goods, and service providers should place a high priority on strengthening consumer attitudes as well as religiosity(Tuhin et al., 2022). To get people to choose Halal purchases, companies that sell Halal goods and services should focus on improving religious and consumer attitudes.

As the Halal business grows and changes, the certification process needs to be more open and accountable. People who depend on Halal products often don't know what the certification standards are for things that aren't food, which lets fake goods be sold. Halal certification protects customers, assures product Halal, and promotes business ethics (Saifuddin, 2020). The customers are hurt, and the Halal industry as a whole gets a bad name. Because many products in the Muslim market are still mixed with products that aren't certified as Halal.

More education and awareness among consumers about the certification process for non-food products is needed to solve this problem. This could be done by making educational video games like "HII," which teaches players how to spot fake goods and how the certification process works. This game might make people more aware of Halal certification and show how important it is in many fields. Furthermore, consumers will be more likely to believe that the goods on the market are real Halal goods if stricter certification rules and guidelines are put in place. Because there are still many products available in the Muslim market sector that are blended with non-Halal certified products (Nurhayati & Hendar, 2020).

## METHODOLOGY

Agile Methodology emerged as the way to develop the "Halal Integrity Inspector" game. Agile breaks the game development process into smaller steps, or iterations, that focus on features related to investigating premises and stopping fraud. This supports continuous improvement. This method makes it easier to get input, make changes, and adapt. User briefs help organise development and set goals for each version. They offer short descriptions of how a feature works from the user's point of view. Collaboration and communication are important parts of the Agile method. This means that independent developers may approach classmates, teachers, potential players, Halal integrity experts, or gamers for comments, which can give them useful information. Agile development also encourages adaptability and ongoing growth, which makes it easier to deal with changes, make small improvements, and keep making the quality better. Playtesting and getting feedback from people who might play are important Agile practices that help improve the game's features, fix bugs, and make sure they comply with the designer's vision. By employing the Agile method to make the "Halal Integrity Inspector" game, ideas like flexibility, teamwork, adaptability, and constant improvement are

accepted. This makes for a game that changes to meet user needs and provide a useful and enjoyable experience. The steps of planning, designing, developing, testing, deploying, and reviewing that are used with this approach. Furthermore, the fact that many software companies use the Agile approach shows how well it works for managing software projects, as shown by a survey of many software companies. Due to its simplicity and effectiveness, the Agile methodology is perfect for projects with limited time frames. It speeds up the development process and needs fewer resources than other methods. Different methods have benefits and drawbacks, but the simplicity and usefulness of the Agile methodology make it perfect for making a wide range of software and application solutions.

The Game Engagement Questionnaire (GEQ) is a way to measure different parts of a player's involvement in a game, such as their motivation, enjoyment, and immersion. It usually has a number of things or statements that players rate on a scale (Vandercruysse et al., 2012). Giving the evaluation to players after they've played the game is part of implementing the GEQ because it lets them give feedback on how engaged they were. Insights into how well the game captures and keeps players' attention during the gaming experience can be gained by developers by looking at the answers gathered through the GEQ. Utilising this methodology, data such as average scores, frequency, and percentages are examined to learn more about how engaging and beneficial the game represents.

## RESULT AND DISCUSSION

In the context of the HII project, the GEQ is used to find out how interested and immersed players are. Researchers can learn more about different aspects of involvement, such as cognitive, emotional, and behavioral aspects, by giving the GEQ to people who have played the HII game. This is important: cognitive engagement measures how mentally focused, attentive, and intellectually stimulated players are by the game's material. This is a very important part of figuring out how well the HII game helps kids think critically, solve problems, and understand the complicated Halal business.

In addition, the emotional involvement part of the GEQ gives us useful information about how players feel while they play. It checks how much the game makes people feel good

emotions like enjoyment and energy, as well as bad emotions like anger or boredom. Figuring out how players feel is very important for keeping them interested and making them happy, as it can lead to changes in the story, the way the game works, and the general experience for the user.

In the same way, the GEQ's behavioral engagement dimension looks at what players do and how they connect with others in the game world. This means checking how immersed they are, how persistent they are, and how interested they are in doing tasks, solving problems, and exploring the virtual world. Developers can find ways to improve game physics, level design, and social features by looking at behavioral engagement data. This helps players connect and interact with each other more. Because of this, players become more interested in and linked to the game, which makes the whole experience richer and more immersive (Khaldi et al., 2023).

As the GEQ helps with a full examination, the Halal Integrity Inspector game can get better over time, turning into a more interesting and educational tool that clearly and effectively shares information about the Halal business. From Table 1 below, can be seen that the engagements element that were implemented and being adopted to the project were Competence, Immersion, Flow, Tension, Challenge, Negative Affect and Positive Affect. Also, from Table 1 below a total score of 68.23% on the Game Engagement Questionnaire (GEQ) for the Halal Integrity Inspector (HII) shows that players are somewhat interested in the game. This number shows that a lot of players are constantly involved and interested in the game, but there is still room for improvement to get more people involved.

Table 1: GEQ Score Result

Game Engagement	Total Mean	Maximum Possible Mean	Percentage Engagement (%)
Competence	7.512	10	75.12
Immersion	8.814	10	88.14
Flow	7.592	10	75.92
Tension	4.953	10	49.53

Challenge	4.86	10	48.6
Negative Affect	4.14	10	41.4
Positive Affect	13.303	15	88.69
Overall Total	51.174	75	68.23

The Game Engagement Questionnaire (GEQ) that was given to Halal Integrity Inspector (HII) players revealed some interesting details about how engaged players were during gaming. As measured by different types of involvement, players showed a high level of immersion and competence, with mean scores of 8.814 and 7.512 out of a possible 10. This means that players were really into the game and thought they were good at beating its tasks, which suggests that they had a strong sense of mastery and understood how it worked and what the goals were.

With a mean score of 7.592 out of 10, the results also show that players were in a pretty high level of flow. Flow is the state of being completely absorbed and focused on an action. This means that players were deeply involved and immersed in the game. But it's important to note that some parts of involvement, like tension and challenge, got lower mean scores of 4.953 and 4.86 out of 10. While players were very interested and involved in the game, this suggests that they may not have felt as much stress or challenge. This could mean that the game could use some tweaks to make it more balanced and interesting. Also, players reported pretty low levels of negative affect, with a mean score of 4.14 out of 10. This means that the game did not make them feel very frustrated or unhappy. Positive affect, on the other hand, was high among players, with a mean score of 13.303 out of 15. This meant that the game was successful at making players feel good feelings like enjoyment, excitement, and satisfaction.

With a mean score of 51.174 out of 75, the Halal Integrity Inspector game was able to involve players and make them feel good, according to the results. This means that 68.23% of players were engaged. If you want to make future versions of the game more engaging and satisfying for players, these results will help you do that.

## CONCLUSION

Finally, the results of the Game Engagement Questionnaire (GEQ) that was given to Halal Integrity Inspector (HII) players show how engaged they were during gaming, which is very useful information. Overall, players showed a high level of immersion and skill, which showed that they felt very good about their abilities and were involved in overcoming the difficulties of the game. Players said they were in a pretty high level of flow, which means they were deeply immersed and focused on the game. To make the experience more balanced and stimulating, stress and challenge should be increased. Importantly, the game was excellent at making people feel good emotions like delight and fulfilment while minimizing bad ones. This made the player experience mostly good. These results show that the HII game is good at keeping players interested and making them feel good. Some also suggest that the game should be improved and refined even more in future versions to keep players interested and happy.

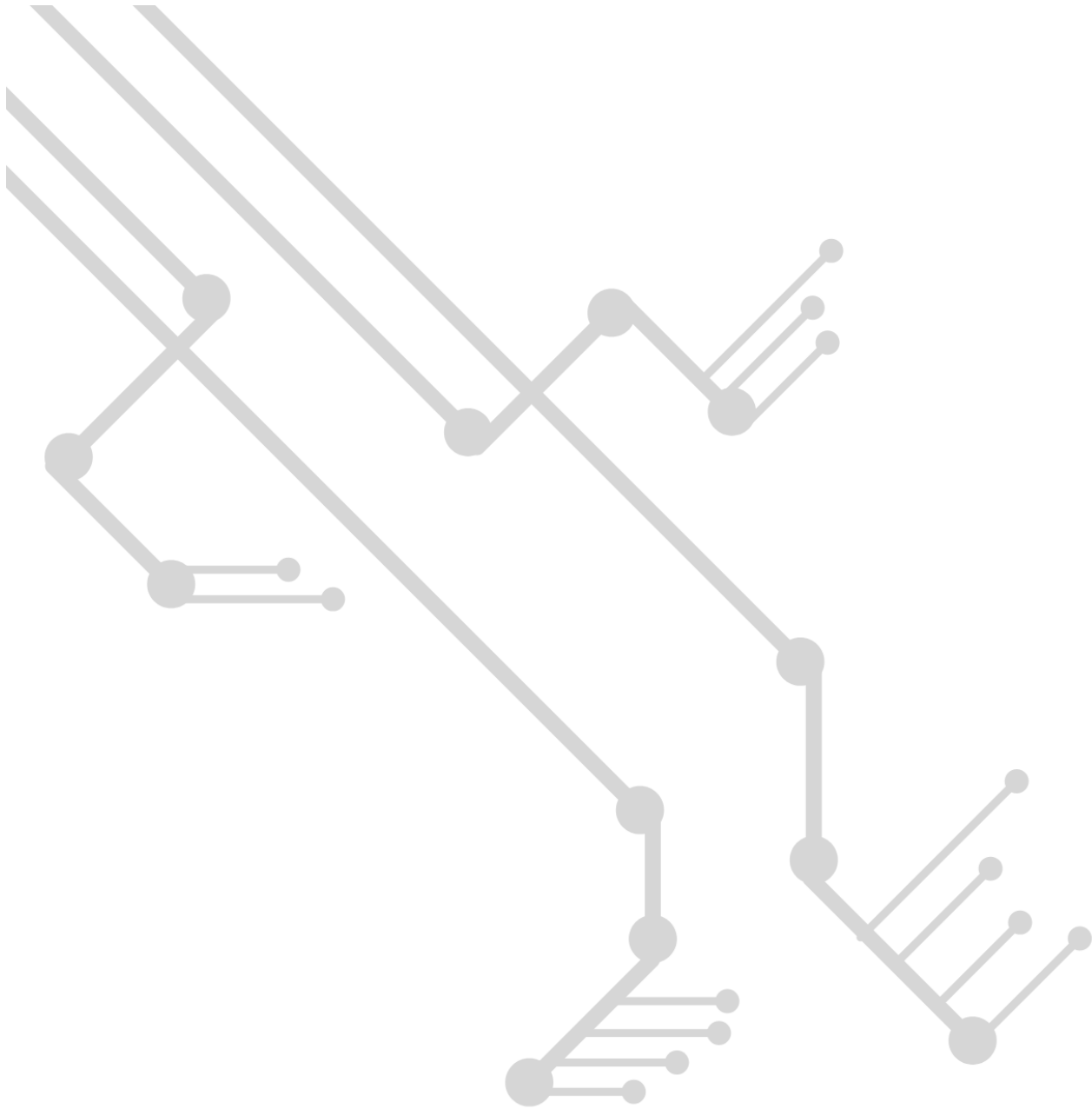
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