# APPLICATION FOR ETHICAL APPROVAL

**In order for research to result in benefit and minimise risk of harm, it must be conducted ethically.**

The University follows the OECD Frascati manual definition of **research activity**: "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications". As such this covers activities undertaken by members of staff, postgraduate research students, and both taught postgraduate and undergraduate students working on dissertations/projects.

The individual undertaking the research activity is known as the "principal researcher".

**This form must be completed and approved prior to undertaking any research activity.**

## SECTION A: About You (Principal Researcher)

| | | |
|---|---|---|
| 1 | Full Name: | Md. Saidul Islam Arif |
| 2 | Student Number: | 2428155 |
| 3 | Email address: | 2428155@student.uwtsd.ac.uk |
| 4 | Programme of Study: | MSc In Cybersecurity and Digital Forensics |
| 5 | Director of Studies/Supervisor: | |

## SECTION B: Internal and External Ethical Guidance Materials

| | | |
|---|---|---|
| | Please list the core ethical guidance documents that have been referred to during the completion of this form (including any discipline-specific codes of research ethics, location-specific dodes of research ethics, and also any specific ethical guidance relating to the proposed methodology). Please tick to confirm that your research proposal adheres to these codes and guidelines. You may add rows to this table if needed. | |
| 1 | **UWTSD Research Ethics & Integrity Code of Practice** | ☒ |
| 2 | **UWTSD Research Data Management Policy** | ☒ |
| 3 | | ☐ |

## SECTION C: Details of Research Activity

| | | | | |
|---|---|---|---|---|
| 1 | Indicative title: | A Forensic Framework for Preserving Volatile Data in Cloud Environments: A Practical Approach Using FTK Imager and Cloud-Native Technologies | | |
| 2 | Proposed start date: | | Proposed end date: | |

**Introduction to the Research (maximum 300 words in each section)**

**Ensure that you write for a <u>Non-Specialist Audience</u> when outlining your response to the three points below:**

- *Purpose of Research Activity*
- *Proposed Research Question*
- *Aims of Research Activity*
- *Objectives of Research Activity*

Demonstrate, briefly, how **<u>Existing Research</u>** has informed the proposed activity and explain

| | |
|---|---|
| | • *What the research activity will add to the body of knowledge*<br>• *How it addresses an area of importance.* |
| 3 | **Purpose of Research Activity**<br>This research aims to address challenges in digital forensic investigations within cloud computing environments, particularly focusing on preserving volatile data (like memory and logs) in multi-tenant architectures. With increasing adoption of cloud-native technologies (like AWS Lambda and Docker), traditional forensic methods are becoming obsolete. This study proposes a framework that automates volatile data capture using FTK Imager in cloud settings, ensuring tenant-specific data isolation and legal compliance (e.g., GDPR). The research is of practical importance to forensic analysts, cloud security practitioners, and law enforcement, enhancing the reliability and efficiency of forensic processes in real-world cloud infrastructures. |
| 4 | **Research Question**<br>How can volatile data be effectively preserved in multi-tenant cloud environments using FTK Imager and cloud-native technologies while ensuring data isolation and compliance with privacy regulations? |
| 5 | **Aims of Research Activity**<br>To develop and validate a standardized forensic framework that captures and preserves volatile data in multi-tenant cloud environments using FTK Imager and cloud-native technologies like AWS Lambda and Docker. |
| 6 | **Objectives of Research Activity**<br>Design a forensic framework for volatile data capture in AWS and Azure.<br>Develop and implement tenant-specific data isolation techniques.<br>Test framework performance in controlled simulations.<br>Assess compliance with privacy regulations (GDPR, CCPA).<br>Contribute recommendations for integrating cloud-native tools into forensic processes. |
| | **Proposed data collection methods (maximum 600 words)**<br>Provide a brief summary of all the methods that **may** be used in the research activity to collect data, making it clear what specific techniques may be used. If methods other than those listed in this section are deemed appropriate later, additional ethical approval for those methods will be needed. You do not need to justify the methods here, but should instead describe how you intend to collect the data necessary for you to complete your project. |
| 7 | • Set up simulated multi-tenant cloud environments using AWS and Azure.<br>• Deploy virtual machines and containerized services.<br>• Simulate incidents (e.g., file access, logins).<br>• Use FTK Imager to capture memory dumps.<br>• Use AWS Systems Manager and Azure Monitor for runtime logs.<br>• Network data captured using Wireshark.<br>• Data is hashed (SHA-256) and tagged using metadata for isolation.<br>• Python scripts will automate data collection and analysis.<br>No human participants are involved. Data used is synthetic/test data in controlled lab setups**.** |

**SECTION D: Scope of Research Activity**

| | **Will the research activity include:** | **YES** | **NO** |
|---|---|---|---|
| 1 | Use of a questionnaire or similar research instrument? | ☐ | ☒ |
| 2 | Use of interviews? | ☐ | ☒ |
| 3 | Use of focus groups? | ☐ | ☒ |
| 4 | Use of participant diaries? | ☐ | ☒ |
| 5 | Use of video or audio recording? | ☐ | ☒ |
| 6 | Use of computer-generated log files? | ☒ | ☐ |
| 7 | Participant observation with their knowledge? | ☐ | ☒ |

| | | | |
|---|---|---|---|
| 8 | Participant observation without their knowledge? | ☐ | ☒ |
| 9 | Access to personal or confidential information without the participants' specific consent? | ☐ | ☒ |
| 10 | Administration of any questions, test stimuli, presentation that may be experienced as physically, mentally or emotionally harmful / offensive? | ☐ | ☒ |
| 11 | Performance of any acts which may cause embarrassment or affect self-esteem? | ☐ | ☒ |
| 12 | Investigation of participants involved in illegal activities? | ☐ | ☒ |
| 13 | Use of procedures that involve deception? | ☐ | ☒ |
| 14 | Administration of any substance, agent or placebo? | ☐ | ☒ |
| 15 | Working with live vertebrate animals? | ☐ | ☒ |
| 16 | Procedures that may have a negative impact on the environment? | ☐ | ☒ |
| 17 | Other primary data collection methods. Please indicate the type of data collection method(s) below. | ☐ | ☒ |
| | Details of any other primary data collection method:<br><br>Synthetic simulation of cloud activity logs and memory dumps. No personal or real-world user data involved. | | |

If you have ticked NO to every question then the research activity is (ethically) low risk and you may skip section E and continue to section F.

If YES to any question, then no research activity should be undertaken until full ethical approval has been obtained.

**SECTION E: Intended Participants**

| | **Who are the intended participants:** | **YES** | **NO** |
|---|---|---|---|
| 1 | Students or staff at the University? | ☐ | ☒ |
| 2 | Adults (over the age of 18 and competent to give consent)? | ☐ | ☒ |
| 3 | Vulnerable adults? | ☐ | ☒ |
| 4 | Children and Young People under the age of 18? (Consent from Parent, Carer or Guardian will be required) | ☐ | ☒ |
| 5 | Prisoners? | ☐ | ☒ |
| 6 | Young offenders? | ☐ | ☒ |
| 7 | Those who could be considered to have a particularly dependent relationship with the investigator or a gatekeeper? | ☐ | ☒ |
| 8 | People engaged in illegal activities? | ☐ | ☒ |
| 9 | Others. Please indicate the participants below, and specifically any group who may be unable to give consent. | ☐ | ☒ |
| | Details of any other participant groups:<br>Complete this only if your participants cannot give consent. This includes animals<br><br>(this box should expand as you type) | | |

| | **Participant numbers and source**<br>Provide an estimate of the expected number of participants. How will you identify participants and how will they be recruited? | |
|---|---|---|
| 10 | How many participants are expected? | 0 |

| | | |
|---|---|---|
| | | |
| 11 | Who will the participants be? | None – simulations only |
| 12 | How will you identify the participants? | N/A |

| | **Information for participants:** | **YES** | **NO** | **N/A** |
|---|---|---|---|---|
| 13 | Will you describe the main research procedures to participants in advance, so that they are informed about what to expect? | ☐ | ☐ | ☒ |
| 14 | Will you tell participants that their participation is voluntary? | ☐ | ☐ | ☒ |
| 15 | Will you obtain written consent for participation? | ☐ | ☐ | ☒ |
| 16 | Will you explain to participants that refusal to participate in the research will not affect their treatment or education (if relevant)? | ☐ | ☐ | ☒ |
| 17 | If the research is observational, will you ask participants for their consent to being observed? | ☐ | ☐ | ☒ |
| 18 | Will you tell participants that they may withdraw from the research at any time and for any reason? | ☐ | ☐ | ☒ |
| 19 | With questionnaires, will you give participants the option of omitting questions they do not want to answer? | ☐ | ☐ | ☒ |
| 20 | Will you tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs? | ☐ | ☐ | ☒ |
| 21 | Will you debrief participants at the end of their participation, in a way appropriate to the type of research undertaken? | ☐ | ☐ | ☒ |
| 22 | If NO to any of above questions, please give an explanation | | | |
| | You should be able to tick YES for all of these questions. If not, then explain why not in this box.<br><br>*(this box should expand as you type)* | | | |

| | **Information for participants:** | **YES** | **NO** | **N/A** |
|---|---|---|---|---|
| 24 | Will participants be paid? | ☐ | ☐ | ☒ |
| 25 | Is specialist electrical or other equipment to be used with participants? | ☐ | ☐ | ☒ |
| 26 | Are there any financial or other interests to the investigator or University arising from this study? | ☐ | ☐ | ☒ |
| 27 | Will the research activity involve deliberately misleading participants in any way, or the partial or full concealment of the specific study aims? | ☐ | ☐ | ☒ |
| 28 | If YES to any question, please provide full details | | | |
| | You should be able to tick NO for most of these questions. For any cases that you have ticked YES then provide details in this box. If you are using cameras/voice recorders to record interviews then please state that in this box.<br><br>*(this box should expand as you type)* | | | |

## SECTION F: Anticipated Risks

| | **Outline any anticipated risks that may adversely affect any of the participants, the researchers and/or the University, and the steps that will be taken to address them.** | |
|---|---|---|
| 1 | **Risks to participants**<br>For example: sector-specific health & safety, emotional distress, financial disclosure, physical harm, transfer of personal data, sensitive organisational information. If you have identified in section D that there are no participants then enter N/A and go skip to question 3. | |
| | Risk to participants: | *How you will mitigate the risk to participants:* |

| | | |
|---|---|---|
| | N/A — no human participants. | *(this box should expand as you type)* |
| 2 | If research activity may include sensitive, embarrassing or upsetting topics (e.g. sexual activity, drug use) or issues likely to disclose information requiring further action (e.g. criminal activity), give details of the procedures to deal with these issues, including any support/advice (e.g. helpline numbers) to be offered to participants. Note that where applicable, consent procedures should make it clear that if something potentially or actually illegal is discovered in the course of a project, it may need to be disclosed to the proper authorities | |
| | N/A — simulated incidents only. | |
| 3 | **Risks to the investigator**<br>For example: personal health & safety, physical harm, emotional distress, risk of accusation of harm/impropriety, conflict of interest | |
| | **Risk to the investigator:**<br>Low. Working in virtualized environments. | *How you will mitigate the risk to the investigator:*<br>**Mitigation:** Use secure, university-managed systems and comply with lab safety protocols. |
| 4 | **University/institutional risks**<br>For example: adverse publicity, financial loss, data protection | |
| | **Risk to the University:**<br>Potential data loss or misinterpretation if proper storage isn't enforced. | *How you will mitigate the risk to the University:*<br><br>**Mitigation:** Data will be securely stored on University Office 365 cloud with encryption and strict access controls. |
| 5 | **Environmental risks**<br>For example: accidental spillage of pollutants, damage to local ecosystems | |
| | **Risk to the environment:**<br>N/A — no physical experiments. | *How you will mitigate the risk to environment:*<br><br>*(this box should expand as you type)* |

**SECTION G: Feedback, Consent and Confidentiality**

If you have identified in section D that there are no participants then enter skip this section and continue to section H.

| | |
|---|---|
| 1 | **Feedback**<br>What de-briefing and feedback will be provided to participants, how will this be done and when? |
| | N/A — no participants. |
| 2 | **Informed consent**<br>Describe the arrangements to inform potential participants, before providing consent, of what is involved in participating. Describe the arrangements for participants to provide full consent before data collection begins. If gaining consent in this way is inappropriate, explain how consent will be obtained and recorded in accordance with prevailing data protection legislation. |
| | N\A |
| 3 | **Confidentiality / Anonymity**<br>Set out how anonymity of participants and confidentiality will be ensured in any outputs. If anonymity is not being offered, explain why this is the case. |
| | No personally identifiable data is collected. All simulated data will be anonymized and securely stored. |

**SECTION H: Data Protection and Storage**

| | Does the research activity involve personal data (as defined by the General Data Protection Regulation 2016 "GDPR" and the Data Protection Act 2018 "DPA")? | **YES** | **NO** |
|---|---|---|---|
| 1 | ***"Personal data"*** *means any information relating to an identified or identifiable natural person ('data subject'). An identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person. Any video or audio recordings of participants is considered to be personal data.* | ☐ | × |
| | If YES, provide a description of the data and explain why this data needs to be collected: | | |
| 2 | This includes audio/video data of participants, but can also include IP addresses and usernames. Names, addresses and emails also count, as do consent forms.<br><br>*(this box should expand as you type)* | | |
| | Does it involve special category data (as defined by the GDPR)? | **YES** | **NO** |
| 3 | ***"Special category data"*** *means sensitive personal data consisting of information as to the data subjects' –*<br>*(a) racial or ethnic origin,*<br>*(b) political opinions,*<br>*(c ) religious beliefs or other beliefs of a similar nature,*<br>*(d) membership of a trade union (within the meaning of the Trade Union and Labour Relations (Consolidation) Act 1992),*<br>*(e) physical or mental health or condition,*<br>*(f) sexual life,*<br>*(g) genetics,*<br>*(h) biometric data (as used for ID purposes),* | ☐ | × |
| | If YES, provide a description of the special category data and explain why this data needs to be collected: | | |
| 4 | What counts as 'sensitive' will differ between cultures. Any information on behaviour that is not in accordance with cultural norms would count as sensitive personal data.<br><br>*(this box should expand as you type)* | | |

| | **Will data from the research activity (collected data, drafts of the thesis, or materials for publication) be stored in any of the following ways?** | **YES** | **NO** |
|---|---|---|---|
| 5 | Manual files (i.e. in paper form)? | ☐ | ☒ |
| 6 | University computers? | ☐ | ☒ |
| 7 | Private company computers? | ☐ | ☒ |
| 8 | Home or other personal computers? | ☒ | ☐ |
| 9 | Laptop computers/ CDs/ Portable disk-drives/ memory sticks? | ☒ | ☐ |
| 10 | "Cloud" storage or websites? | ☒ | ☐ |
| 11 | Other – specify: | ☐ | ☐ |
| 12 | For all stored data, explain the measures in place to ensure the security of the data collected, data confidentiality, including details of backup procedures, password protection, encryption, anonymisation and pseudonymisation: | | |
| | All data will be kept in password protected cloud storage on the University Office 365 system which will not be shared. Audio/visual data will be transcribed and would be shown to participants to | | |

| | |
|---|---|
| | check accuracy of reporting. Any USB sticks used to store or transfer data will be password protected. All participants will be given a unique identifier to ensure confidentiality and this list will be kept securely in the password protected folder. |

| | **Data Protection** | | |
|---|---|---|---|
| | Will the research activity involve any of the following activities: | **YES** | **NO** |
| 13 | Electronic transfer of data in any form? | ☒ | ☐ |
| 14 | Sharing of data with others at the University outside of the immediate research team? | ☐ | ☒ |
| 15 | Sharing of data with other organisations? | ☐ | ☒ |
| 16 | Export of data outside the UK or importing of data from outside the UK? | ☐ | ☒ |
| 17 | Use of personal addresses, postcodes, faxes, emails or telephone numbers? | ☐ | ☒ |
| 18 | Publication of data that might allow identification of individuals? | ☐ | ☒ |
| 19 | If YES to any question, please provide full details, explaining how this will be conducted in accordance with the GDPR and Data Protection Act (2018) (and/or any international equivalent): | | |
| | All data will be encrypted and kept in password protected cloud storage on the University Office 365 system which will not be shared. Any USB sticks used to store or transfer data will be password protected. All data transfers will be encrypted and password protected. All participants will be given a unique identifier to ensure confidentiality and this list will be kept securely in the password protected folder. The data will be stored until the completion of the project and then deleted. In accordance with the DPA2018, participants will have the right to ask to see what data is held relating to them, and this data will be deleted immediately if the participant requests this, in which case the data will not be used in the project. | | |
| 20 | List all who will have access to the data generated by the research activity: | | |
| | Data shared internally with supervisor. No third-party access. No identifiable data will be published | | |
| 21 | List who will have control of, and act as custodian(s) for, data generated by the research activity: | | |
| | Principal researcher and supervisor. | | |
| 22 | Give details of data storage arrangements, including security measures in place to protect the data, where data will be stored, how long for, and in what form. | | |
| | All data will be encrypted and kept in password protected cloud storage on the University Office 365 system which will not be shared. Any USB sticks used to store or transfer data will be password protected, and will be reformatted at the end of the project in order to destroy the data. The data will be stored until the completion of the project and then deleted. | | |
| 22 | Confirm that you have read the UWTSD guidance on data management (see https://www.uwtsd.ac.uk/library/research-data-management/) | ☒ | |
| 23 | Confirm that you are aware that you need to keep all data until after your research has completed or the end of your funding | ☒ | |

**SECTION I: Declaration**

| | | | |
|---|---|---|---|
| | The information which I have provided is correct and complete to the best of my knowledge. I have attempted to identify any risks and issues related to the research activity and acknowledge my obligations and the rights of the participants.<br><br>In submitting this application I hereby confirm that I undertake to ensure that the above named research activity will meet the University's Research Ethics and Integrity Code of Practice which is published on the website: https://www.uwtsd.ac.uk/research/research-ethics/ | | |
| 1 | **Signature of applicant:** | Md. Saidul Islam Arif | **Date:** |
| 2 | Director of Studies/Supervisor: | | **Date:** |
| 3 | Signature: | | |

***FOR INTERNAL USE ONLY:***

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|---|---|---|---|
| | **Ethical approval given** | | |
| 1 | **Signature of assessor:** | | **Date:** |
| 2 | Name: | | |
| 3 | Role: | | |