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# E-NEWS LETTER

## Master of Computer Applications

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### LATEST UPDATES WORLD

#### Distributed protocol underpinning cloud computing automatically determined safe and secure

*In an important step toward ensuring the protocols that dictate how our networked services operate are safe, secure and running as expected, University of Michigan researchers have automated a technique called formal verification.*



Their system proves, without any human effort, that one of the most foundational distributed computing protocols—known as Paxos—meets its specifications. The achievement refutes a common assumption that the Paxos protocol and others like it are too complex to be proven secure without hours of manual work.

"Paxos is one of the first and most celebrated ideas that laid the foundation for how different things come to an agreement asynchronously," said Aman Goel, a doctoral student in computer science and engineering, who presented the work at the Formal Methods in Computer-Aided Design Conference Oct. 20.

The dominance of cloud computing and rising technologies like blockchain applications have changed how organizations and individuals engage with computing, creating a world powered by networked machines under a constantly growing load.

As a consequence, our critical infrastructure is more susceptible than ever to widespread fallout from server outages, hackers and buggy network behavior. Airtight distributed protocols are needed to ensure that software systems can effectively run on machines spread across the world.

These protocols are extremely complex algorithms that define how machines in a network can work collaboratively as a single system. Paxos is one of the most important examples of the category, describing an approach called consensus that has been put to use in nearly all critical distributed systems, including all of the applications supported by cloud computing.

Most recently, consensus has garnered widespread attention for enabling blockchain applications like cryptocurrencies. Such protocols form the backbone of a blockchain by helping all nodes in the network verify transactions as they happen.

"Most—if not all—consensus algorithms fundamentally derive concepts from Paxos," Goel said.

Formal verification is a class of techniques used to demonstrate that something is correct and reliable with the elegance of a logical proof. The process is very useful for software and hardware alike, providing a certificate that a certain

algorithm, working piece of software or computer chip will always operate the way its specifications say it should. Theoretically, it would enable software to be released with substantially less testing than currently needed.

"Having a foolproof system that says: You develop it, you check it automatically and you get a certificate of correctness, that's what gives you confidence that you can deploy a program without issue," said Karem Sakallah, professor of computer science and engineering.

Unfortunately, proving the correctness of a program with many complex behaviors ranges from tedious to impossible—making burgeoning techniques to automate the process extremely powerful. But for algorithms on the scale of Paxos, automating its formal verification was deemed simply too large a job to ever finish successfully.

"There have been many attempts in the past to verify Paxos, including many manual attempts," Goel said. "Everyone points to a prior theoretical result that says automating it is impossible—it's beyond the tools of automation to be able to prove it."

The team's solution makes use of a feature common to all distributed protocols: Regularity. In the systems under consideration, all servers working on a particular function will be handling large batches of requests that look fundamentally the same, and the nature of their tasks will change very little over time.

This regularity enabled Goel and Sakallah to transform what started as an impossibly large task into one that looks small and manageable. They did so quite literally—by verifying the protocol under the assumption that it had a fixed, small number of nodes, and then generalizing the solution to a "theoretically unbounded number" of nodes.

The tool the researchers designed for this proof is called IC3PO, a model checking system that looks through every state a program can enter

and determines whether it matches a description of safe behavior. If the protocol is correct, IC3PO produces what's termed an inductive invariant—a proof by induction that the property holds in all cases. If instead a bug is found in the protocol, it will produce a counter-example and execution trace, showing step by step how the bug manifests.

The inductive invariant IC3PO produced for Paxos in under an hour identically matches the human-written one previously derived with significant manual effort using a technique called interactive theorem proving. On top of speeding the process up, it also produces a proof with very succinct and digestible documentation.

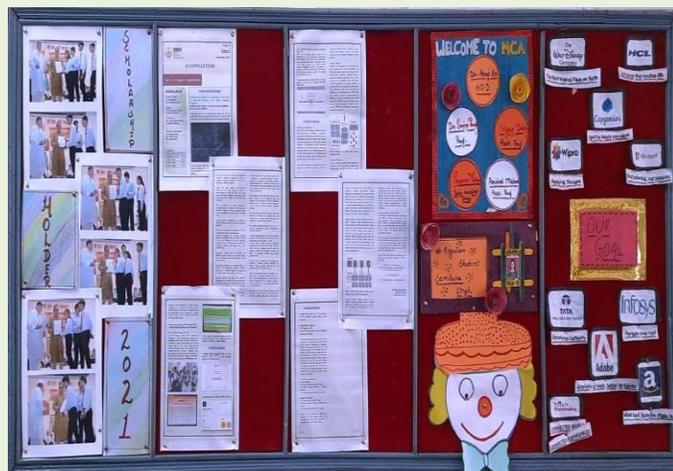
Verifying the correctness of Paxos automatically has major ramifications for the future. As new consensus protocols are built atop its principles for ever-changing applications, they'll need to be proven safe and secure. Using a model checker like this can enable humans to work with complex software that's proven safe without having to understand every minor detail of how it works.

## DEPARTMENT ACTIVITY

### 1. Zero hour activity on 7<sup>th</sup> October, 2021 (Wall Magazine Decoration)

On 7<sup>th</sup> October, 2021 MCA first year students took the initiative in club activity and presented a Wall Magazine with 4-different sections and revealed their creative ideas. The sections included some information about construction of website and top 10 IT companies; a completely different section was made which included the Scholarship Holders 2021 of MCA department.

Among all the sections, one section was for the E-News Letter which included all the information about the previous month activities. Last but not the least hard work and dedication of students resulted in great appreciation throughout the college.



### 2. Zero hour activity on 14<sup>th</sup> October 2021 (Badminton)

#### Venue: Multipurpose Hall

MCA department organized badminton activity in the club activity hour to enhance the sportsman spirit among students. In which MR. Vijay Kumar Dubey and other Faculty members were present to motivate students.

In this cherished activity where all the students enjoy this activity but also show their team player spirit. This game was held between two teams –Team1 were Virendra Kumar and Rajat Saxena and Team2 were Arsh Rupainwar and Ashutosh Maurya

This activity not only gave students a real boost to their preparation and also helps to relieve their mind and tackle the situation. All the players were holding a good time and Team 2 got the winner place.





### 3. Zero hour activity on 21th October 2021 (Volleyball Competition)

#### Venue: Main Ground

On 21st October 2021, the MCA department organized a volleyball activity in the club activity hour. In which MR. Vijay Kumar Dubey and other Faculty members were present to motivate students.

This game was held between two teams –Team 1-Arsh Rupainwar, Gaurav Mishra and Ashutosh, and Team 2 were Virendra Kumar, Jaswant Singh, Amit Kumar and Jaspreet Kaur. All the players were holding a good time and giving their best performance but TEAM 1 got the first position.



### 4. Zero hour activity on 28<sup>th</sup> October 2021 (C-coding competition)

#### Venue: MCA Lab

For enhancing the logical thinking of students, the MCA department conducted a C-coding Test activity on 28 October in club activity hour. The test was designed to revise the C concepts of students. In which MR. Vijay Kumar Dubey and other Faculty members were present in the Lab.

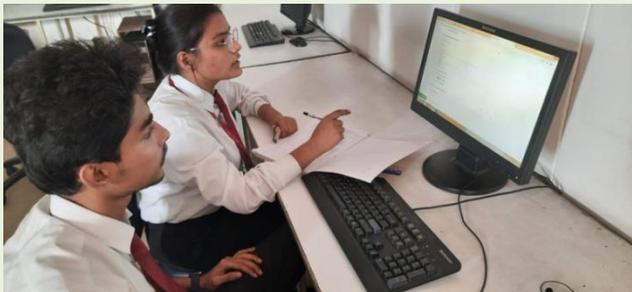
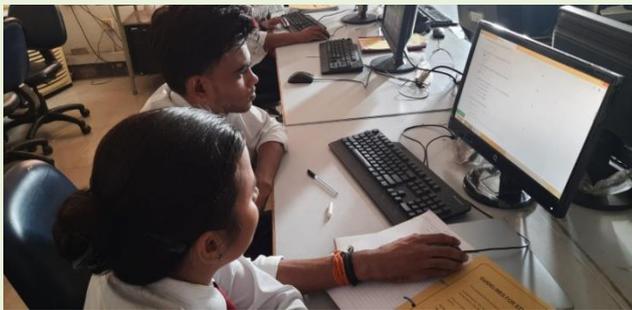
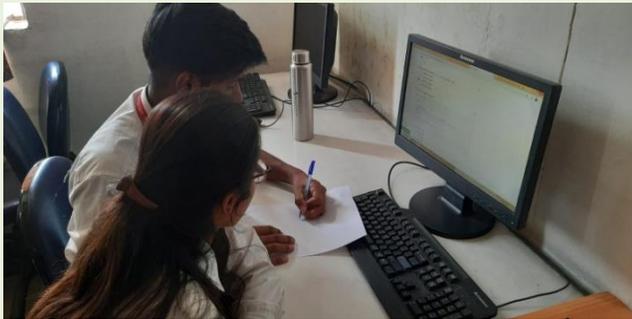
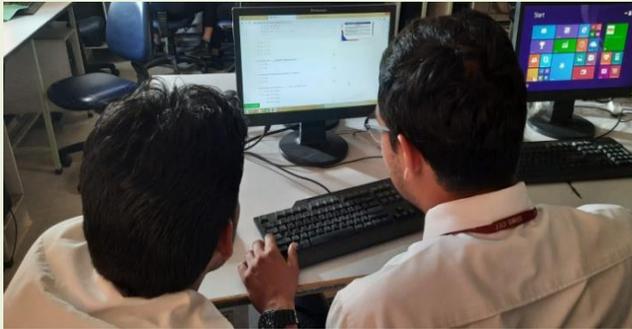
This test not only revised the foundation knowledge of students also help to find the best answer in the team.

There are four groups which were participated in the test Group -1 Sachin Saxena and Samiksha Singh, Group-2 Gitanjali Joshi and Rajat

Saxena, Group-3 Amit Kumar and Arsh Rupainwar and Group -4 Sakshi Gangwar and Ashutosh Maurya.

This activity not only gave students a real boost to their preparation and also helps to find the area which needs revision.

All the Groups were giving their best efforts to find the answer and score well, but Group -3 win the test by scoring the highest number in test.



## STUDENT CORNER

**Gaurav Mishra, student of MCA final year** achieved Common Service Center Certificate and also completed certificate course in entrepreneurship (CCE) offered by CSC Academy.



## COLLEGE UPDATE

**2<sup>nd</sup> October, 2021 | Saturday**

**Venue: Centennial Auditorium**

*“Gratitude is not only the memory but the homage of the heart rendered to God for his Goodness.”*

Commemorating the altruism of late Shri Ram Murti Ji, who was a true Gandhian, veteran freedom fighter, and much more, SRMS cherishes his contributions through the promotion of education and research which was established in year 1990.

The event commenced with the lamp lightening ceremony and some religious songs of praise which filled the auditorium with sanguine vibes. City mayor Dr. Umesh Gautam graced the occasion with his benign presence.

Ashish Kumar Sir threw light on the stupendous life of late Shri Ram Murti Ji on his 33rd tribute ceremony. Thereafter, Aditya Murti Sir spoke upon the laudable accomplishments of SRMS trust over the years.

The spectators were bewitched by the awe-inspiring acts of charity and magnanimity done by late Shri Ram Murti Ji. After Chairman Sir's words of motivation, the much awaited "Pratibha Alankran samaroh" began. Shri Jayant Krishna Ji and Ustad Shakhir Khan were bestowed with graces and honor. The winners of debate and story telling competition were given shields and cash prizes to praise their efforts.

It was a moment of pride for all the deserving and meritorious students when they were bestowed with the scholarship prize money after immense hard work and perseverance. There were total 480 scholarship recipients from IBS, IMS, SRMS Unnao, SRMS CETR, SRMS CET, Nursing College and Paramedical College.

Finally, the event concluded with the vote of thanks by Dean Academics Dr. Prabhakar Gupta Sir.



*Following MCA Final Year Students Got The Scholarship by The Chairman Sir:*



(Gitanjali Joshi MCA student)





(Ashutosh Maurya MCA student)



(Sakshi Gangwar MCA student)



(Arsh Rupenwar MCA student)



(Sachin Saxena MCA student)



(Samiksha Singh MCA student)