



E-NEWS LETTER

Master of Computer Applications

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Contents:

Latest Updates World	01-03
Departmental activity	03-03
Student Corner	03-04
Faculty Corner	04-05
College Update	05-05

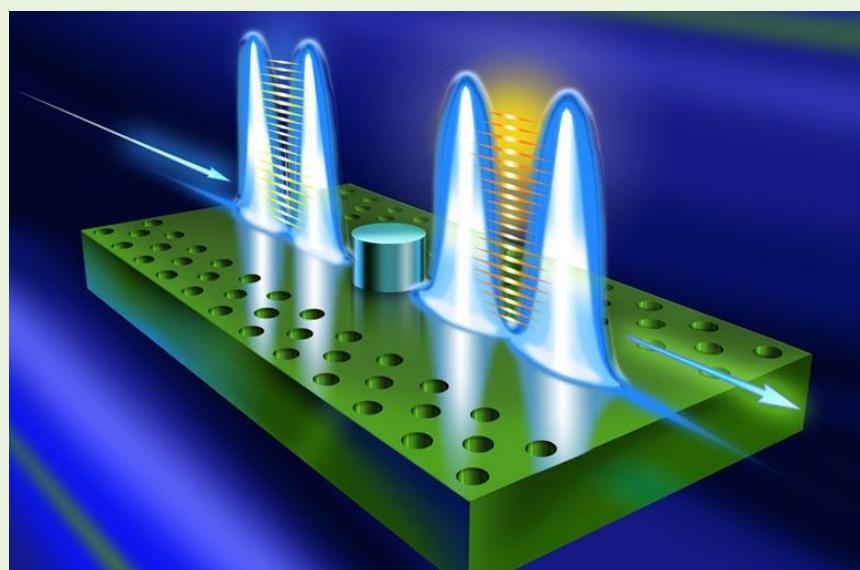
LATEST UPDATES WORLD

Missing Piece Discovered in the Puzzle of Optical Quantum Computing

An efficient two-bit quantum logic gate has been out of reach, until now.

Research from the McKelvey School of Engineering at Washington University in St. Louis has found a missing piece in the puzzle of optical quantum computing.

Jung-Tsung Shen, associate professor in the Preston M. Green



Department of Electrical & Systems Engineering, has developed a deterministic, high-fidelity two-bit quantum logic gate that takes advantage of a new form of light. This new logic gate is orders of magnitude more efficient than the current technology.

“In the ideal case, the fidelity can be as high as 97%,” Shen said. His research was published in May 2021 in the journal Physical Review.

The potential of quantum computers is bound to the unusual properties of superposition — the ability of a quantum system to contain many distinct properties, or states, at the same time — and entanglement — two particles acting as if they are correlated in a non-classical manner, despite being physically removed from each other.

Where voltage determines the value of a bit (a 1 or a 0) in a classical computer, researchers often use individual electrons as “qubits,” the quantum equivalent.

Electrons have several traits that suit them well to the task: they are easily manipulated by an electric or magnetic field and they interact with each other. Interaction is a benefit when you need two bits to be entangled — letting the wilderness of quantum mechanics manifest. But their propensity to interact is also a problem. Everything from stray magnetic fields to power lines can influence electrons, making them hard to truly control.

For the past two decades, however, some scientists have been trying to use photons as qubits instead of electrons. “If computers are going to have a true impact, we need to look into creating the platform using light,” Shen said.

Photons have no charge, which can lead to the opposite problems: they do not interact with the environment like electrons, but they also do not interact with each other. It has also been challenging to engineer and to create ad hoc (effective) inter-photon interactions. Or so traditional thinking went.

Less than a decade ago, scientists working on this problem discovered that, even if they weren’t entangled as they entered a logic gate, the act of measuring the two photons when they exited led them to behave as if they had been.

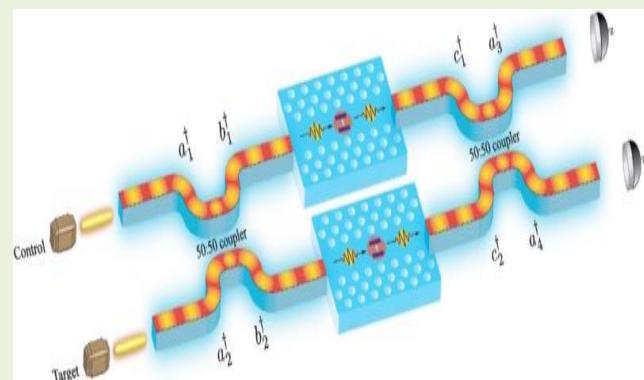
The unique features of measurement are another wild manifestation of quantum mechanics.

“Quantum mechanics is not difficult, but it’s full of surprises,” Shen said.

The measurement discovery was groundbreaking, but not quite game-changing. That’s because for every 1,000,000 photons, only one pair became entangled. Researchers have since been more successful, but, Shen said, “It’s still not good enough for a computer,” which has to carry out millions to billions of operations per second.

Shen was able to build a two-bit quantum logic gate with such efficiency because of the discovery of a new class of quantum photonic states — photonic dimers, photons entangled in both space and frequency. His prediction of their existence was experimentally validated in 2013, and he has since been finding applications for this new form of light.

When a single photon enters a logic gate, nothing notable happens — it goes in and comes out. But when there are two photons, “That’s when we predicted the two can make a new state, photonic dimers. It turns out this new state is crucial.”



High-fidelity, two-bit logic gate, designed by Jung-Tsung Shen. Credit: Jung-Tsung Shen

Mathematically, there are many ways to design a logic gate for two-bit operations. These different designs are called equivalent. The specific logic gate that Shen and his research group designed is

the controlled-phase gate (or controlled-Z gate). The principal function of the controlled-phase gate is that the two photons that come out are in the negative state of the two photons that went in.

"In classical circuits, there is no minus sign," Shen said. "But in quantum computing, it turns out the minus sign exists and is crucial."

"Quantum mechanics is not difficult, but it's full of surprises."

When two independent photons (representing two optical qubits) enter the logic gate, "The design of the logic gate is such that the two photons can form a photonic dimer," Shen said. "It turns out the new quantum photonic state is crucial as it enables the output state to have the correct sign that is essential to the optical logic operations."

Shen has been working with the University of Michigan to test his design, which is a solid-state logic gate — one that can operate under moderate conditions. So far, he says, results seem positive.

Shen says this result, while baffling to most, is clear as day to those in the know.
"It's like a puzzle," he said. "It may be complicated to do, but once it's done, just by glancing at it, you will know it's correct."

DEPARTMENT ACTIVITY

1. Club Activity report on 1st July 2021

Venue - MBA Seminar Hall

A cultural activity was organized in the MBA Seminar Hall on 1st July 2021 in which all the students of MCA and MBA participated.

This activity was organized to increase enthusiasm among the students and to support the art, where the students had to display any of these four talents which were Singing, Dancing, Mimicry and Poetry.



In the end the event ended with a fresh energy among the students and was efficiently completed in the presence of the HOD of departments and faculty members.

STUDENT CORNER

- Ashutosh Maurya, students of MCA 1st year** achieved 5-stars (*****) in Java Language proficiency from hacker rank.

Ashutosh Maurya
@m_ashutosh_1642
India
in
[Edit Intro](#)

About
Current
-
Expected year of Graduation
2022
Education

Verified Skills
Java (Basic) Verified
SQL (Basic) Verified

Badges
Java *****
Sql **
C language ***

2. Arsh Rupenwar, students of MCA 1st year received a certificate from the Udemy for his successfully completed 10.5 total hours of learn java by building 17 projects step by step online course.



Udemy, is an American massive open online course (MOOC) provider aimed at professional adults and students. It was founded in May 2010 by Eren Bali, Gagan Biyani, and Oktay Caglar.

As of April of 2021, the platform has more than 40 million students, 155,000 courses and 70,000 instructors teaching courses in over 65 languages. There have been over 480 million course enrollments. Students and instructors come from 180+ countries and 2/3 of the students are located outside of the U.S.

FACULTY CORNER

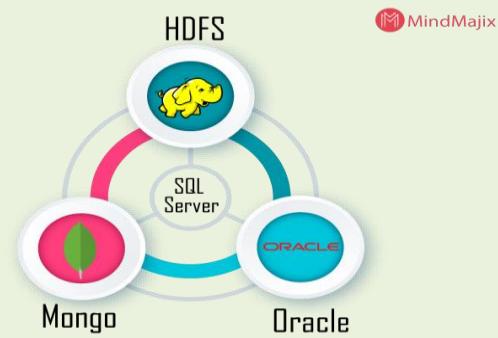
SQL Server 2021 with Unique Feature

There is an advancement made to SQL server 2021 to release the new version, which is SQL Server 2021 making it more efficient and stable. This new feature is discussed below in detail.

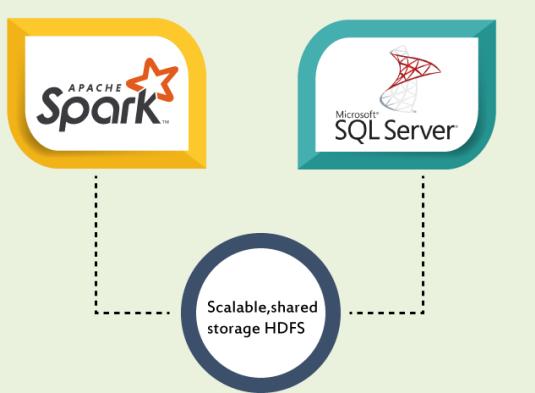
Big Data Clusters

Big data clusters are new additions to the SQL server 2019 release. This feature allows you to deploy multiple, scalable clusters of SQL Server, Spark, and HDFS containers running on Kubernetes, at once. The Big data Cluster, as an infrastructure, allows these clusters to run parallelly, where you can read, write, and process Big Data from Transact-SQL to Spark. It enables us to easily combine and analyze the high-value relational data with high-volume big data.

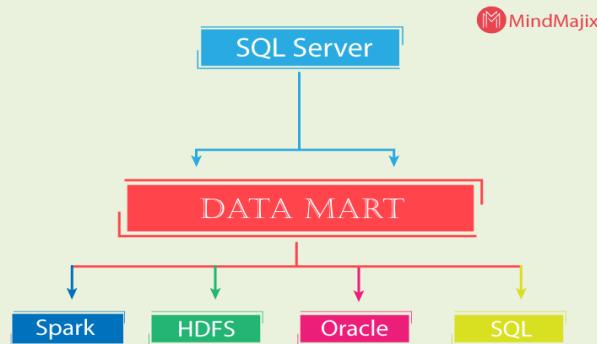
- **Data Virtualization:** SQL Server PolyBase has eased the task of querying the external data sources for the SQL Server big data clusters, by reducing the effort of moving or copying the data for making a query. SQL Server 2019 preview has introduced new connectors to data sources.



- **Data Lake:** The big data cluster allows for a scalable HDFS storage pool. This potentially increases the efficiency of big data storage from external sources.



- **Scale-out data mart:** Big data cluster provides scale-out compute and storage to improve the data analysis. The data can be ingested and stored across multiple data pool nodes as cache, for further analysis.



- **Integrated AI and Machine Learning:** The big data cluster allows for AI and ML on the data stored across multiple HDFS storage pools and data pools. SQL server provides many built-in AI tools like R, Python, Scala or Java.

- **Management and Monitoring:** The cluster administrator portal is the website that provides the status and health of the pods in the cluster. It also provides links for other dashboards for log analytics and monitoring.

Advantages of Big Data Cluster:

- Has built-in snippets for regular management tasks.

- Allows browsing HDFS, to create directories, to preview files and upload files.
- Allows creating, opening and running Jupyter-compatible notebooks.
- The creation of external data sources has been simplified by the Data Virtualization Wizard.
- Big data cluster with K8 infrastructure increases the speed of setting up the whole group infrastructure.
- The security concerns arising with the integration of the relational environment with the Big Data are handled completely by the big data clusters.
- The data virtualization allows for easy data integration without having to perform ETL (extract, transform, and load).

Mr. Vijay Kumar Dubey
Assistant Professor
Department of MCA

COLLEGE UPDATE

- College conducted Pre-University exam from 26th July onwards and internal practical lab Viva Voce on 31st July for MCA first year students
- Tyro club organized the Skribble completion on 8th July, 2021 on the Child Labour theme. Skribble completion winners list:

The flyer for the SRMS Skribbl Competition Result features the college's logo and name at the top. Below that, it says "Skribbl Competition RESULT Organized By : TYRO Club". A large red flame graphic surrounds the results table. The table lists three winners:

Sr.No.	Names	Branch-Batch	Position
1.	Khushi Khan	CSE-20	1
2.	Naved Khan	IT-20	2
3.	Shruti Saxena	B.Pharm-19	3

At the bottom right, there is a signature and the text "(Shivangi Shukla) Tyro President".