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# **CAPSTONE PROJECT**

## **INTELLIGENT CLASSIFICATION OF RURAL INFRASTRUCTURE PROJECT**

**Presented By:**

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# OUTLINE

- **Problem Statement**
- **Proposed System/Solution**
- **System Development Approach (Technology Used)**
- **Algorithm & Deployment**
- **Result (Output Image)**
- **Conclusion**
- **Future Scope**
- **References**

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# PROBLEM STATEMENT

**Example:** The Pradhan Mantri Gram Sadak Yojana (PMGSY) is a flagship rural development program in India, initiated to provide all-weather road connectivity to eligible unconnected habitations. Over the years, the program has evolved through different phases or schemes (PMGSY-I, PMGSY-II, RCPLWEA, etc.), each with potentially distinct objectives, funding mechanisms, and project specifications. For government bodies, infrastructure planners, and policy analysts, efficiently categorizing thousands of ongoing and completed projects is crucial for effective monitoring, transparent budget allocation, and assessing the long-term impact of these schemes. Manual classification is time-consuming, prone to errors, and scales poorly.

The task is to design, build, and evaluate a machine learning model that can automatically classify a road or bridge construction project into its correct PMGSY\_SCHEME based on its physical and financial characteristics.

# PROPOSED SOLUTION

- The proposed system aims to address the challenge of predicting the PMGSY Scheme based on its physical and financial characteristics. This involves leveraging machine learning techniques to forecast demand patterns accurately. The solution will consist of the following components:
- Data Collection:
  - Gather and utilize real-time data sources, such as length and number of road work sanctioned, length and number of bridge work sanctioned, state with district names, to enhance prediction accuracy.
- Machine Learning Algorithm:
  - Implement a machine learning algorithm, such as XGB Classifier, Batched tree ensemble Classifier, to predict PMSGY Scheme.
- Deployment:
  - Develop a user-friendly interface or application that provides real-time predictions for the scheme.
  - Deploy the solution on a scalable and reliable platform, considering factors like server infrastructure, response time, and user accessibility.
- Evaluation:
  - Assess the model's performance using appropriate metrics such as Accuracy or other relevant metrics.

# SYSTEM APPROACH

The "System Approach" section outlines the overall strategy and methodology for developing and implementing the scheme prediction system. Here's a suggested structure for this sections:

- System requirements:

- IBM Cloud (mandatory)

- IBM Watson Studio for model developmen and deployment

- IBM Cloud object storage for data handling

# ALGORITHM & DEPLOYMENT

- **Algorithm Selection:**

Batched Tree Ensemble Classifier (XGB Classifier).

- **Data Input:**

Number and length of road work and bridges sanctioned, cost of both the sanctioned, state and district names, .

- **Training Process:**

Supervised Learning with labeled PMGSY Scheme.

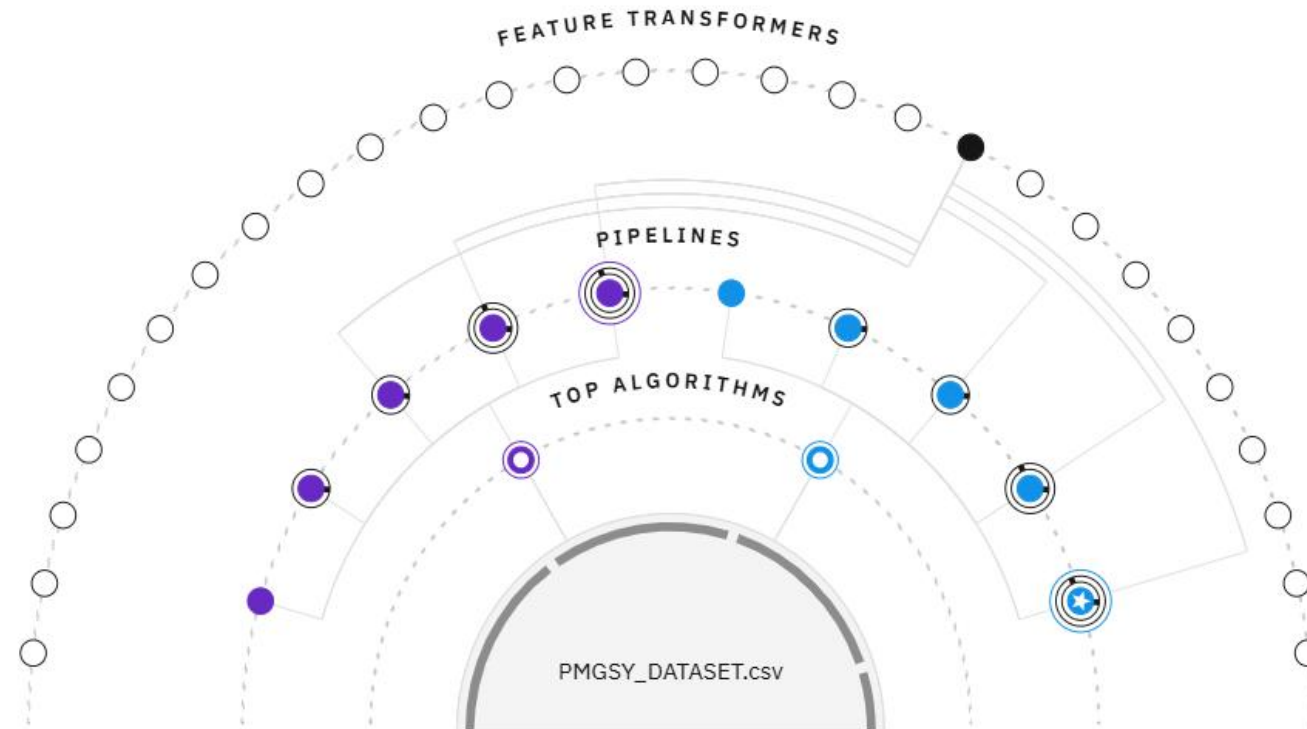
- **Prediction Process:**

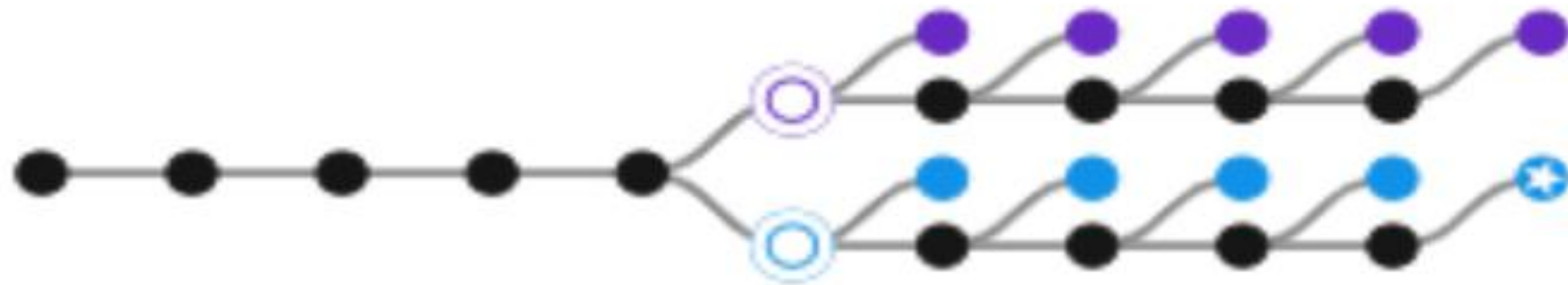
Model Deployed on IBM Watson Studio with API endpoint for real-time predictions.

# RESULT

## Relationship map ⓘ






Prediction column: PMGSY\_SCHEME







## Pipeline leaderboard

	Rank 	Name	Algorithm	Specialization	Accuracy (Optimized) Cross Validation	Enhancements	Build time
★	1	Pipeline 10	 Batched Tree Ensemble Classifier (XGB Classifier)	INCR	0.924	HPO-1 FE HPO-2 BATCH	00:01:41
	2	Pipeline 9	 XGB Classifier		0.924	HPO-1 FE HPO-2	00:01:37
	3	Pipeline 8	 XGB Classifier		0.924	HPO-1 FE	00:01:02
	4	Pipeline 7	 XGB Classifier		0.918	HPO-1	00:00:22

# INPUT DATA:

Enter input data

Text

JSON

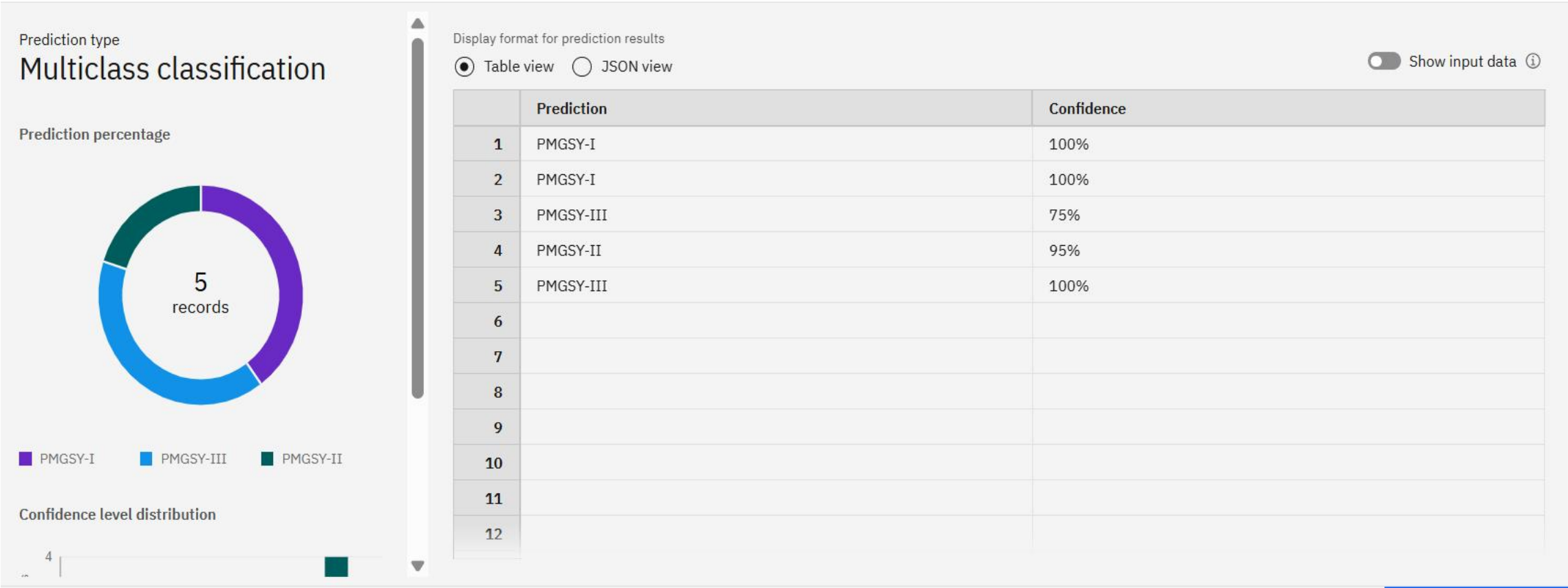
Enter data manually or use a CSV file to populate the spreadsheet. Max file size is 50 MB.

[Download CSV template](#) [Browse local files](#) [Search in space](#) [Clear](#)

	PLETED (double)	EXPENDITURE_OCCURED (double)	NO_OF_ROAD_WORKS_BALANCE (double)	LENGTH_OF_ROAD_WORK_BALANCE (double)	NO_OF_BRIDGES_BALANCE (double)	COLUMN15 (double)
1		75.601	0	0	0	0
2		517.912	0	0	1	0
3		31.212	1	3.85	1	0
4		49.6181	1	0.3	0	0
5		6.5333	20	229.272	0	0
6						

PREDICTION RESULT:

Prediction results



# CONCLUSION

- Intelligent Classification of Rural Infrastructure Project is a real-time project of building roads and bridges in different districts of several states. This project comes under 3 different categories of PMGSY Schemes. In this project, PMGSY Schemes have been classified based on the states and districts and other factors. It has been analysed, trained by machine learning models and deployed by using IBM's Watsonx AI Services. The accuracy of 92% has been achieved by using Batched Tree Ensemble Classifier (XGB Classifier) for successfully predicting the results.

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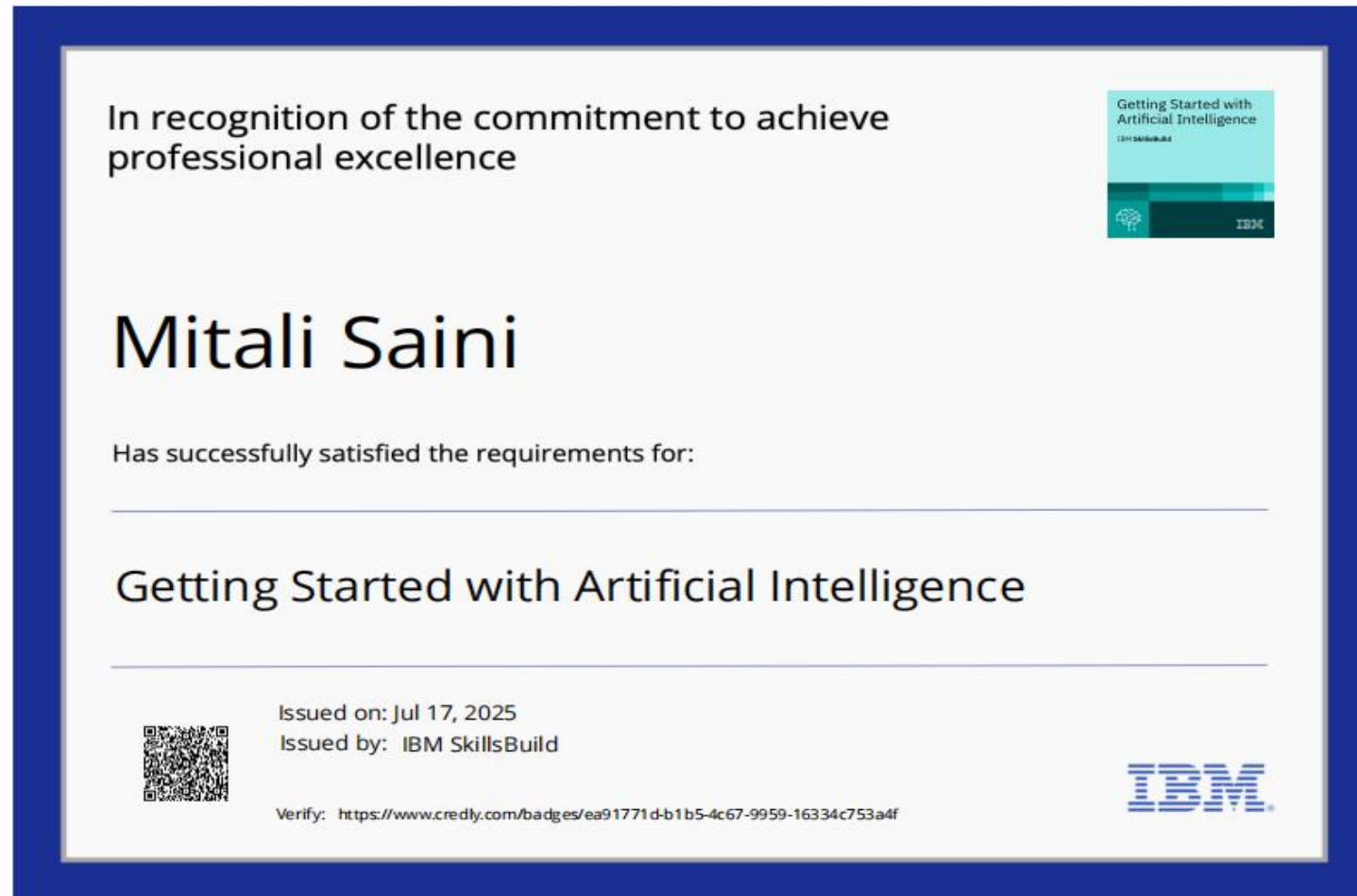
# FUTURE SCOPE

- It will help in managing smart infrastructure. AI can analyze environmental and usage data to design infrastructure that is better able to withstand extreme weather events and other challenges.
- Our focus towards Sustainability and Resilience will be increased.
- Smart infrastructure in rural areas can enhance more technology and education.

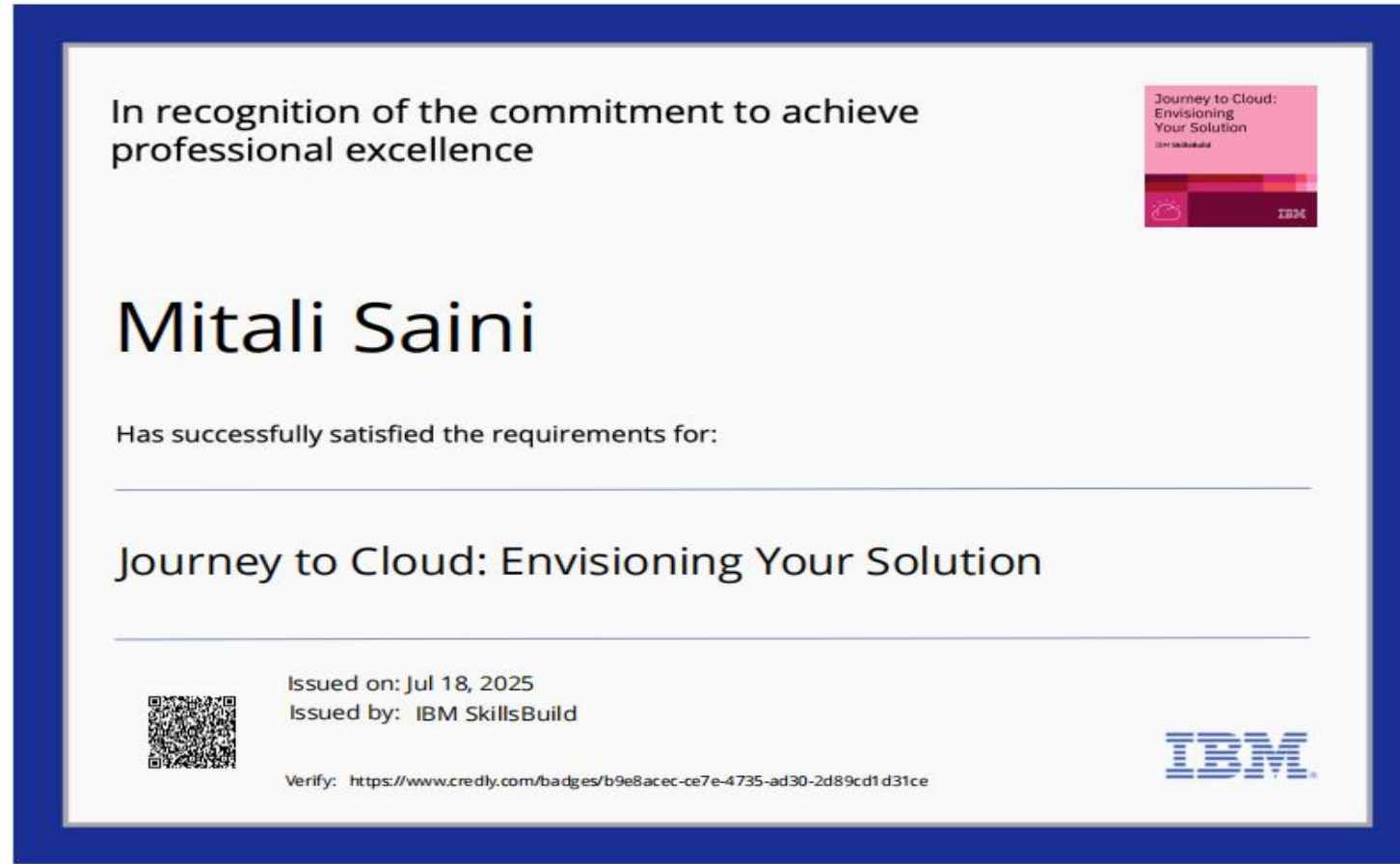
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# IBM CERTIFICATIONS



# IBM CERTIFICATIONS





# IBM CERTIFICATIONS





**THANK YOU**