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Career Goal

A career in managing software development by hiring and developing a highly capable team who can deploy scalable and reliable software solutions at pace and at scale. Passionate in using techniques in functional programming to develop crisp and effective solutions. I focus on the customer by deriving actionable insights from their usage data.

Technical Skills

17+ years of experience in Building Software Products. Prolific in development using **Kotlin, GO, Java, Scala, Perl, Python, C++ [MFC], C#, .NET**, in **Linux/Unix/Mac** and **Windows** environment. My skills include full cycle of product engineering from presales to sales to post sales, including product development, implementation, customer management, managing people, and software testing. I have deep experiences in developing reusable business workflows and UI presentation layers using JQuery, Microsoft WPF. I have understanding of JVM at byte code level. To improve upon Java's development lifecycle, I have designed and implemented multiple scriptable and embeddable languages for business programming. One of them is publicly available as ZoomBA. (<https://gitlab.com/non.est.sacra/zoomba>) It leverages the advantages of JVM and makes developing Java programs quicker by an order of magnitude or even higher. I have written plugins for maven and ant build systems. Created add-on for Visual Studio and Microsoft Office & also debugged Windows kernel. Implemented both SOAP and REST API's for business to implement SOA. My experience with real world implementations were used for illustration in the authoritative book on Microservices (<https://www.oreilly.com/library/view/scala-microservices/9781786469342/>).
Pre-print of my research papers can be found at: https://arxiv.org/a/mondal_n_1.html.

I have proven ability to focus on the customer, understand key business drivers, define key metrics of success and drive adherence to processes. I have Strong track record in hiring and retaining world class talent while mentoring and managing them. Excellent communication skills, written and verbal.

Academic Qualifications

Bachelor in Computer Science & Technology from Bengal Engineering College, Shibpur [Now Bengal Science and Technological University] in 2003

Work Experience:

Compass India, Hyderabad, India (March 2020 till Date):

Designation: Staff Software Engineer (Principal Engineer)

Compass is a real estate tech startup (8 years in 2020). First individual contributor hire in the India Organization, was interviewed by invite in New York. Hand-picked by the CTO and India Head to lead the new organization creation effort and delivering fast solutions.

At A Glance – Projects & ROI

1. In the first month of joining fixed 30+ production issues in the Android App – which were pending for years.
2. Created libraries to ensure maximal code reuse – thereby reducing source code by 25%.
3. Android Garbage collection needs improvement – created **GCAssist** infrastructure using Lifecycle Hooks.
4. Written plugin – **Achilles** to find out what portion of the code is slowing down – plugged into Flipper.
5. To speed up CI/CD pipeline with quality – **RAC** – Risk Assessment of Commits was created – which finds out how risky is a commit is. No other firm other than Microsoft has this kind of infrastructure
6. Wrote the spec and implemented **VEGA** – Compass Bleeding Edge next generation voice based mobile app
7. Envisioned **SIRIUS** – an API Aggregator which replaces GRAPHQL – Microservices with Pico-Services – which are custom load balanced DSL driven API Aggregators
8. Designed and Implemented Compass Lead Generation Event Bus

Responsibilities – Hiring, Brand Building, Mentoring, Training

1. Hiring – given Compass India is creating a brand in India:
 - a. Resume review for fitment
 - b. Guiding the recruiters to figure out right fit

- c. 300+ interviews taken in last 6 months
 - d. More than 5 emails are written by the candidates about how great the interview experience was
 - e. Participated even in Recruiter Hiring
2. Mentoring & Guiding people via participating in the
 - a. Inception
 - b. Modelling
 - c. Design
 - d. Code Review

In each of the projects mentioned above.
 3. Mentoring people (30 of them) in
 - a. Day to day work
 - b. Listening to their professional and personal issues – and ways to handle them
 - c. Re-Focusing them on the business problem at hand and delivering value
 - d. Writing Feedback for them
 - e. Writing and Reviewing promotional doc for them
 4. Training – given most of the hires are fresh graduates
 - a. Making them understand the difference between smart vs ROI
 - b. Focusing them on delivery
 - c. Improving presentation skills

Responsibilities – Core Development & Design

1. **Clear Issues Debt:** First month alone fixed all sort of production issues (30+) in the Android app to get accustomed to the android technology. There was not a single technical person in the India team – and this got accolades from the top management. This setup the idea of what the team needs to do next and how.
2. **Achilles:** It is incredibly hard to find out which portion of the source code is taking time to run. This is what Achilles does and use Kotlin DSL. Conceived because test team was talking about controls are popping up slow. This is now integrated as a flipper (<https://github.com/facebook/flipper>) plugin. This plugin will be open sourced.
3. **GCAssist:** Android uses generation 1 garbage collection algorithms – with ART it got improved to Gen 1.5. Hence a lot of standard taken for granted garbage collection does not happen – most notably null leaks and subscription leaks amongst them. Fixing this requires very careful consideration in source code – and follows the same paradigm as the state-based allocation and deallocation, which defeats the purpose of the GC. GCAssist solves this problem by using Kotlin DSL & extension functions – hooked into Android Lifecycle callback. This removed the necessity to careful thinking around memory leaks – increased developer productivity and made the known memory leaks to 0.
4. **RAC – Risk Assessment of Commits:** Imagine a dream of every commit automatically picking up the necessary tests cases to run – among thousands of tests – and coming up with a risk assessment metric. This dream was realized in the RAC. As our CTO pointed out, this was fundamental engineering – starting with finding out what commit impacts directly what classes, then creating dependency graph finding all impacted classes and then from test case mapping (generated using jacoco code coverage) finding out what test cases to run. This was fully designed and specification was created. All college graduates worked in it – and only Microsoft has something similar called CRANE.
5. **SIRIUS:** GraphQL requires complete rewrite of the underlying RESFUL services. SIRIUS is an alternate solution using API Aggregators which has DSL very close to SQL. This is conceived, designed and being implemented in GO & RUST. All microservice based APIs can either be used with it or be replaced by it – hence we call them p-services or Pico-Services.
6. **VEGA:** Working to create the next generation mobile app experience. It comprises of BERT to find out what the consumer and agents are looking for, it uses conversational AI with bucket of words matching for conversational needs. Used RUSTBERT to use the back-end service. Created the whole user storyboard – and the app is being developed using FLUTTER.

Amazon India, Hyderabad, India (Sep 2019 to March 2020):

Designation: Senior Software Engineer (SDE 3)

Working in the FinTech which handles all of Amazons payment to the vendors a daily volume of 10 billion dollars.

Codebase is a decade old – and thus maintenance heavy, and rewrite has been done multiple times. Current push is to apply Statistical Learning techniques in decision making, augmented by rule-based workflow systems which were developed by my team and I.

At A Glance – Projects & ROI

1. Vendor Classification via Bayesian inferencing with respect to transactions (completed, ROI precursor to fraud detection)
2. Fraud Detection in Vendor Payment Interactions (ongoing, ROI ~ 5 Billion USD year on year)
3. Declarative Data Loader from Data Lake to ElasticSearch (completed, time save 90% development time)
4. Configuration based infinitely scalable Workflow Engine - DHARA (completed, time save 80% development time)
5. Configuration Based Unit / UAT / Soak / Performance Testing Data Generator – GlassFrog (completed, time save 60% testing time)
6. DataClass based Database Entity Mapper for Kotlin (completed, this did not exist earlier)

Responsibilities – Mentoring, Managing, Guiding

1. Mentoring & Guiding people via participating in the
 - a. Inception
 - b. Modelling
 - c. Design
 - d. Code Review

In each of the projects mentioned above, with a focus on Amazon's ROI and peoples career goals.

2. Mentoring people (198 of them) in
 - a. Day to day work
 - b. Listening to their professional and personal issues – and ways to handle them
 - c. Re-Focusing them on the business problem at hand and delivering value for Amazon
 - d. Writing Feedback for them
 - e. Writing and Reviewing promotional doc for them

Responsibilities – Core Development & Design

In Amazon things are built for scale, both vertical and horizontal. Under my technical guidance, the new code base is 50% faster due to optimizations, as Amazon decides to spend less and less on AWS.

1. **Vendor Classification:** Bayesian inferencing and Markovian arrival process were used to classify vendors into different classes to decide their capacity of fraud. A leaky bucket was used to siphon or cut some losses for Amazon. Resulting model is equivalent to convolution of two different arrival processes. We found out that a non-zero capped zero gain model is the most appropriate for Amazon to create such a leaky bucket. Actively involved in modelling, simulating design and coding, as lead and individual capacity.
2. **Vendor Fraud Detection:** Once vendors are into a bucket, stochastic model is being used to classify their behavior into potential fraud window. A detail discussion is outside scope of this, and is patent pending, and thus it suffices to say that modelling fraud using an objective function we have achieved a human vs machine detection ratio of close to 1:10, that is if human was earlier able to detect 1 fraud, the resulting system is detecting at least 10. Project is currently in beta phase and simulation is going on. Participated in detailed modelling, simulating, designing and coding.
3. **Declarative Data Loader for Analytics Efforts:** As part of analytics efforts, it was necessary to get data from Amazon's data lake into ElasticSearch, such a system would require writing code with developer efforts for a month. A system is now at place where simply schema of the ElasticSearch is to be passed along with Apache Hive query, and the system automatically gets the data into ElasticSearch system. From earlier specific code, the whole new generic code was written using Scala entirely designed and coded by me.
4. **DHARA, Business Workflow:** FinTech's primary technical challenge is to run workflows of multiple size and scale. Amazon wide solution like HERD and Step Functions existed and they were too heavy for many (50%) of the internal use case. DHARA - Dynamic Herd Like Application for Reusable Algorithms – is a workflow system entirely conceived, designed, and coded by me, which is being used in all moderately sized projects. Written in Kotlin, it uses YAML/JSON to define the workflow with a Turing Complete programming model and its own global context memory. Model of the computation is queue based BFS traversal. Any JSR-223 languages can be used to script on top of it, while programmatic access is available via Kotlin, Scala, Java. It is incredibly fast, and can run a flow comprise of 100 nodes in less than 1 second, while typical business flows are having less than 15 basic blocks.

DHARA has its own test stack to verify flows using BDD.

DHARA has become the predominant basic workflow manager as almost all projects not requiring a huge investment of HERD or Step Function.

Plan is to Open Source the project in GitHub Amazon Repo.

5. **GlassFrog, Test Data Generator & De-Serializer:** FinTech's primary technical challenge of testing is to have right data set to test changes. GlassFrog solves it via defining generators in a declarative way. Individual fields of complex objects can be generated using multitudes of distributions, and then more fields can be added using a merger function. Tuples can be selected based on a condition. This supports JSR223 scripting – so all these can be achieved via scripts too. One can serialize the data class into json or relational CSV format. From where it can further read and deserialize. Entirely conceived, designed, and coded by me, GlassFrog generates a million test inputs per minute to facilitate scale/performance testing as well as used in TestMonkeys. This infrastructure reduced 600% testing efforts, and made tests more production data agnostic – while at the same time taking traits from production data.

Plan is to Open Source the project in GitHub Amazon Repo.

BayesTree Intelligence. Hyderabad & Bangalore, India (Dec 2017 to Sep 2019):

Designation: Partner (Stake Holder)

BayesTree is a Startup which makes Cognitive Enterprise ML Products for Information Flow.

Wearing 2 different hats in BayesTree, one as a Principal, Partner Solution – to ensure the customer gets maximal benefit from the product offering of BayesTree Sainapse, another, as head of Product Engineering ensuring that the lab gets the right feedback and we, the Engineering Division make the right product and infrastructure.

Responsibilities - Principal, Partner Solutions

1. Participate in the Client Visits regularly for Pre and Post sales (more than 100 visits overall)
2. BayesTree's point of contact at every technical interaction with Customers
3. As Head of Products creating new ideas for Products and solutions
4. Working with the BayesTree team along with the Customers Technical team (CIO and tech heads as stake holders), to come up with product solution ideas in various Fortune 500 companies including E&Y, Glenmark, Reliance, Dimension Data, Tripwire, Mindtree. I have to manage close to 20 people per project.

Responsibilities – Head of Engineering & Product

Responsibilities included:

1. Building Products & Solution after taking help from the BayesTree lab
2. Building rapid prototypes using publicly available ML algorithms
3. Head Architect for all BayesTree product lines
4. Actively coded to co-create JOLT, a configuration-based web server on top of Spark Web Framework
 - a. Polyglot Language support as scripting – all JSR 223 languages are supported
 - b. Built in Identity provider mechanism
 - c. Role Based Authentication System
 - d. Cuts the product development time by more than 9/10th.
 - e. Using JOLT BayesTree went live while developing custom solutions based on the product in less than a week
5. Creation of Manual for the infrastructure as well as the product
6. Mentor the team and Give Technical Guidance
7. Come up with implementation strategy for features – wrote 60% codebase of all the products (see JOLT above)
 - a. Created BOA – Bot (Automation) Orchestrator – a system that is functionally equivalent to the “Control Room” of the Business Workflow Automation Products of late
 - b. Created Back-End of the Installer using JOLT

LinkedIn India. Bangalore, India (Nov 2016 to Nov 2017):

Designation: Staff Engineer

Responsibilities – India Careers & WWE

1. Mentor the team and Give Technical Guidance
2. Gatekeeper of Quality – keeping the Code Quality metrics under check
3. Come up with implementation strategy for features

4. Come up with productivity tools for Development:
 - a. A Stateful mocking framework: <https://gitlab.com/non.est.sacra/joker>
 - b. Layout testing framework for Devices and Desktop – Web driver based : <https://github.com/nmondal/layman>
 - c. Unit Testing Kafka dependent source code : <https://github.com/nmondal/kafka-unit>
5. Analyzing time series of user data from production and figuring out interesting pattern in the usage data

Arcesisum India, (Spun out of D.E. Shaw & Co.) and D.E. Shaw & Co. Hyderabad, India (Aug 2010 to Nov 2016):

Designation: Senior Engineering Manager (Designated as PM)

Responsibilities

1. Designer and developer as a lone Individual contributor (alone) for writing codeless API automation framework – ApiUnit this is now available in open source form as nJexl: <https://mvnrepository.com/artifact/com.github.nmondal>
 - a. Fully data driven – integrates with both JUnit and TestNG.
 - b. Fully functional ORM mechanism
 - c. Validation is done using nJexl scripts or almost rarely: using Java
 - d. Capability of full performance testing – this is the de facto performance benchmarking framework for API's in the current firm, arguably the best one available in the whole Industry.
2. Designer and developer as a lone Individual contributor and maintainer of a fork of Apache JMeter (xJMeter: <https://gitlab.com/darth/xJmeter>) which was made enterprise ready by myself:
 - a. Can read from Excel data
 - b. Can handle relational data like ORM
 - c. Can be used in functional testing
 - d. Uses nJexl for validation
 - e. Can use imports on JavaScript
3. Designer and developer as a lone Individual contributor for Java Code coverage plugin – jCover (<https://gitlab.com/darth/jCover>) which gets used for thin live coverage for Java code after deployment. This uses byte code manipulation techniques.
4. Designer and developer for Data comparison and report comparison tool GECO: General Expression Comparator written in Python.
5. Web spider written using Python to verify if all pages of a website are reachable or not (Graph Traversal and Discovery) in Python.
6. PnL Report generation from web-services using Pandas in Python.
7. Individual contributor for developing software related to extracting and transforming financial data from large data stores efficiently.
8. Leader of the **SWAT** team – responsible for finding bad patterns in code and fixing them as an IC, improve code quality.
9. Mentoring and Training team members and new hires with technical assistance, feedback and coaching. Here is a small list of selected people I mentored – who went onto become outstanding:
 - a. <https://www.linkedin.com/in/vivekjohn>
 - b. <https://www.linkedin.com/in/arup-sarkar-6bb2158>
 - c. <https://www.linkedin.com/in/akhila-athresh-ab88142a>
 - d. <https://www.linkedin.com/in/singhvishwanath>
 - e. <https://www.linkedin.com/in/khajanyadav>
 - f. <https://www.linkedin.com/in/abhichanda> (in Microsoft)
10. Responsible for infrastructure projects:

Statistical modeling and maintenance of the software systems workload.

 - a. Usage Clustering
 - b. Statistical Simulation for future trends
 - c. Time Series Analysis
11. Owner of the Performance Testing and Automation Testing for software system in the company.
 - a. Designed and wrote a directed testing framework to optimize and direct test case execution based on source code change between versions of software. See Microsoft CRANE for reference.
 - b. Designed and wrote CHAITIN (A Virtual Machine) which uses Selenium for Browser based Application testing.

Microsoft India Development Center at Hyderabad, India (March 2004 to July 2010)

Designation: Software Design Engineer in Test II

Responsibilities:

1. Development of project [Duet](#) [code named] “Mendocino” at Microsoft, Hyderabad
 June 2005 to August 2008 – based on SOA architecture. Skills used C#, Visual Studio, VSTO, Outlook Add-in, Web Services, Windows Forms, SQL Server. Participated in design, coding and testing of the SOA side, as well as the UI components. Wrote and maintained the automation framework used to test the whole system.

2. Development of project “Information Bridge Framework” at Microsoft, Hyderabad Mar 2004 to June 2005 – based on SOA architecture. Skills used C#, Visual Studio, Visual Studio Add-On, Web Services, Windows Forms. Participated in design, coding and testing of the UI components. Wrote and maintained the automation framework used to test the whole system.
3. Finding root cause in bugs coming from more than 8000 different external applications and assigning to the proper windows feature team owner
 - a. Debugging and fixing the applications or assign the bugs in case the bug is in Windows Core. As Software Development Engineer II [Senior] in Windows Fundamentals. Skills used Windbg & windows API
 - b. Mentoring and Training team members and juniors with technical assistance and overall feedback and coaching. Automation using C#, Perl
4. Owner of the Windows Update Client Components and Distributed Transaction Coordinator component.
 - a. Maintaining virtual lab infrastructure based on System Center Virtual Machine Manager – in power shell and writing components around it.
 - b. Maintaining and Improving Search Algorithm – to be used internally to Search Automation Jobs using keyword Based Algorithms – natural language parsing.
 - c. Mentoring and Training team members and juniors with technical assistance and overall feedback and coaching.

Achievements

1. One of the 3 Finalists (out of 100) in Engineering Excellence at Microsoft – received Certificate from VP.
2. Was given OBA Award [Outstanding Business Achiever Award of Level 2 {the 1st one to receive in India}] for my work in Project Mendocino.
3. Patent in Xml Based UI Design – a WPF parallel approach, [link](#).
4. Designed and maintained automated check-in system called SNAP: Shiny New Automation Process

Patent

Title: Metadata driven user interface.

Abstract: Metadata is used to create customized user interface (UI) portions for an application. The metadata may be XML-based and can be interpreted and then rendered to implement a customized UI that also supports data binding between data and the UI controls. Once created, the metadata is processed by a rendering engine to display the UI controls. An interpreter may be used to interpret the metadata file before it sent to the rendering engine. Neither the rendering engine nor the interpreter needs knowledge of the host application and provides support for arbitrary metadata driven UI. The metadata schema may include mechanisms to create custom controls for the UI; programmatically modify the UI controls by providing access to a code-behind assembly as well as support event handling for the UI controls.

TCG Software Solutions Limited at Kolkata, West Bengal, India: (Aug 2003 to March 2004)

Designation: Software Developer

Responsibilities

1. Supporting of ABI prism 700 (ABI: Applied Bio-Systems are world- wide leader in gene based technologies. They have an instrument named Prism 7000, that use to conduct some biological tests and to analyze the results and performing those tests, they had software) embedded analyzer software module for genetic testing
2. Fixed the maximum number of bugs, as well as fixed a handful number of high severity and priority bugs
Skills used – MFC, C++

Achievements

1. Got special client appreciation for my work in an Individual contributor capacity

Other Information

1. Active Participation and contributor to technical distribution list
2. Voracious reader, good debater, adept painter and cartoonist
3. Amateur Writer- I have interest in several subjects and topics and frequently write about various topics in various forums