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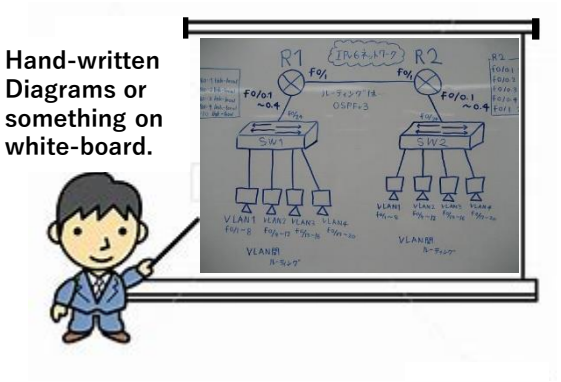
Proposal for Image-2-Slide Demo App to PRIMAGEST Customer

By Cloud Nine Solutions Company
M&C Holdings Inc. Group
October 13, 2018

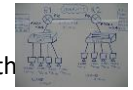
Outline

- App Overview
- Technical Proposal
- Effort Draft Estimation

Overview of Image-2-Slide



Take a photo with smart devices !



Send images and attributes to the AI Platform.

AI Platform

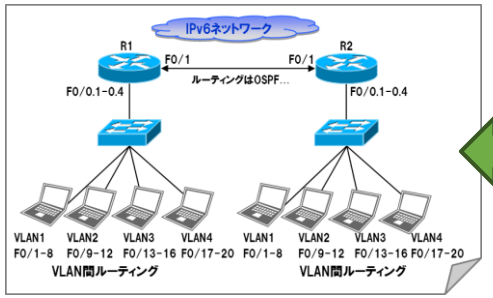
2. And take a photo with smart devices many times instead of hand-writing by ourselves.

[3. **Processes ..**]

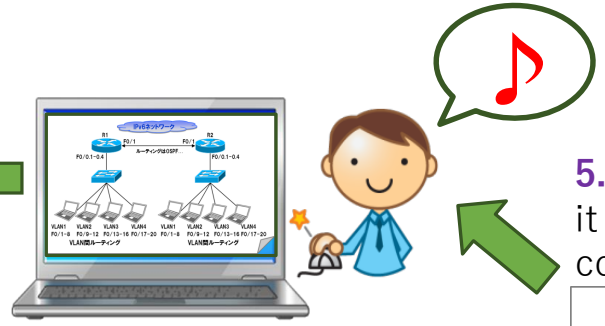
- Extract Line Drawing
- Extract all text
- Processing the Polygons
- Processing the Mark
- In/Output XML modules

..etc.

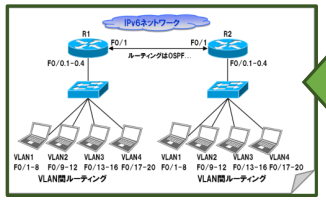
4. More processes with AI functions



5. Generate a new image it has been drawn by the computer!

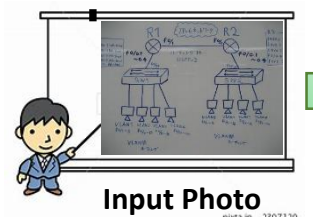


6. After generated the new image, check and its probably necessary to modify or editing the image by themselves.



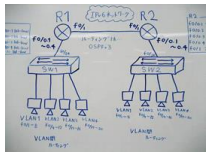
7. Completed.
(.pptx, .xlsx ..etc.)

Technical Proposal Overview



Input Photo
(taken by Smart-Phone)

Step 1



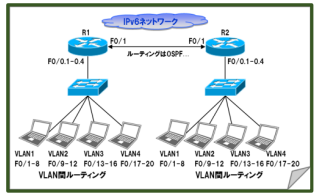
Normalized Photo

Step 2

- Text
- Lines
- Polygons
- Marks

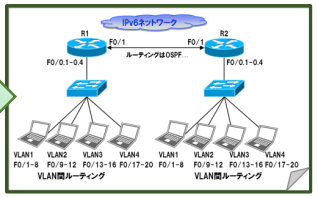
Recognized Objects

Step 3



Generated Layout

Step 4



Final Result

Step 1

- **Target**: Pre-processing input photos to increase the performance of AI tools in Step 2
- **Technique**: Image Processing Techniques will be used to normalize input photos

Step 2

- **Target**: Recognize the Text, Icons, Connectors
- **Techniques**:
  - Deep Learning will be used to recognize Text
  - Image Processing and Deep Learning will be used to recognize Lines, Polygons and Marks

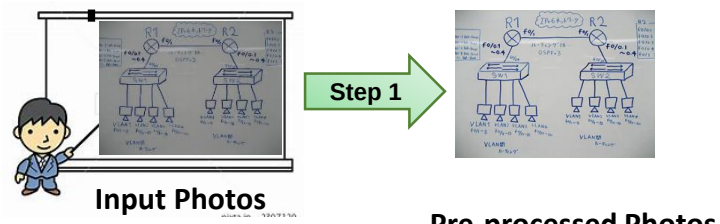
Step 3

- **Target**: Generate the layout based on the relationship of Text, Icons and Connectors
- **Techniques**:
  - XML parser will be created and will be used with the XML libraries and templates
  - XML file will be used to generate the layout of Text, Icons and Connectors

Step 4

- **Target**: Adjust the generated layout
- **Techniques**:
  - User will adjust the generated layout manually by using Editor Software

Technical Proposal - Step 1



Input Photos
(taken by Smart-Phone)

Pre-processed Photos

Overview

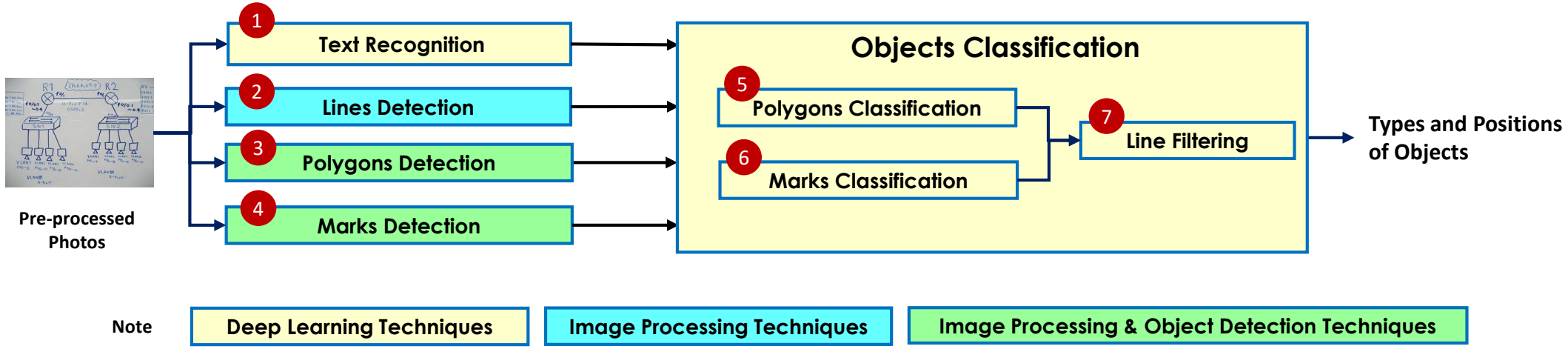
- **Target**
  - Prepare Data before applying AI
- **Input**
  - Photos of handwriting diagrams taken by Smartphone
- **Output**
  - Pre-processed photos

Description

Prepare Data before Applying AI

- Pre-process photos taken by smartphone
  - Input photos are pre-processed by using Image Processing techniques (e.g.: resizing, removing noise) to make sure that pre-processed photos are ready to be used by AI models
  - More data may be created to make sure the data is balance by using data augmentation techniques

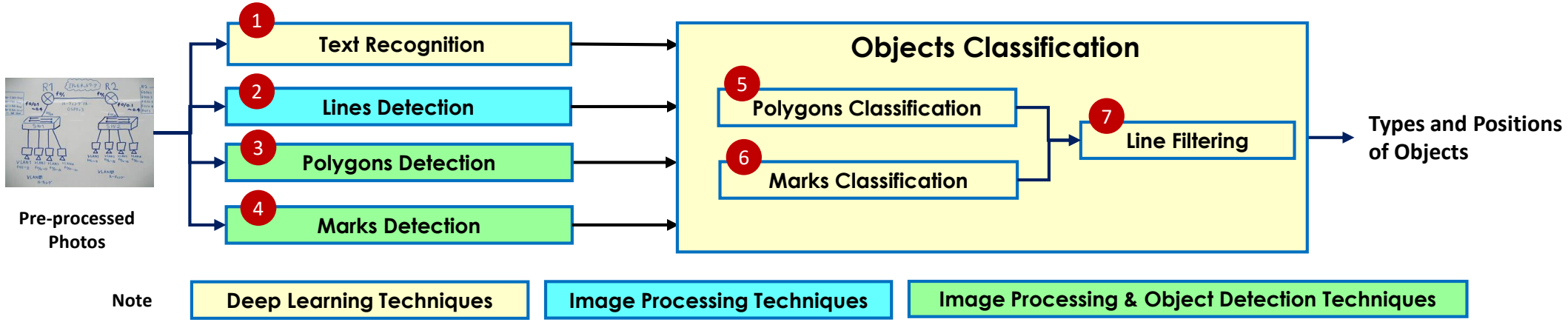
Technical Proposal - Step 2 (1)



Overview

- **Target:** Recognize Objects from the Input image
- **Input:** Pre-processed Image
- **Output:** Set of Recognized Objects (Type and Position)

Technical Proposal - Step 2 (2)



1 Text Recognition

Output:

- Position of Text in the input image
- Content of Text

Technique: Deep Learning

- Use an End-to-End Deep Learning solution
  - Architecture: CNN, RNN (LSTM), Connectionist Temporal Classification (CTC)
  - Training dataset: COCO-Text dataset, Multi-lingual Scene Text, or own dataset
  - Data augmentation: GAN for creating more handwritten characters

2 Lines Detection

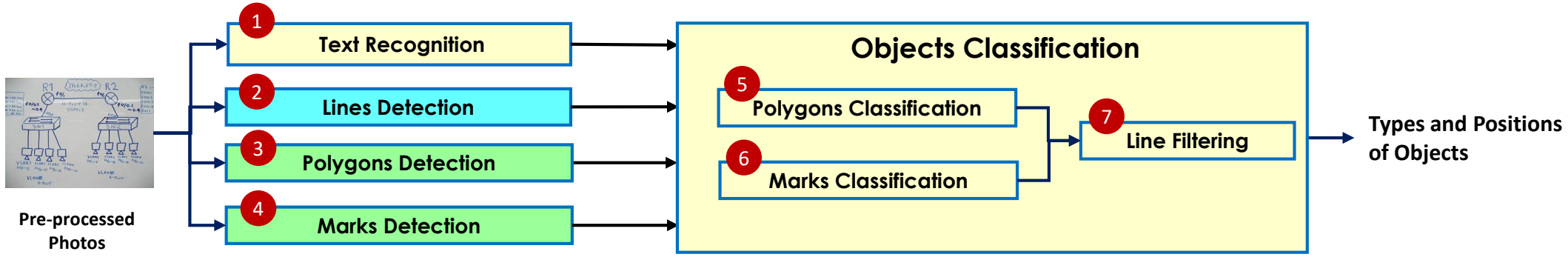
Output:

- Positions of the points belongs to each line

Technique: **Image Processing**

- Extract edges
- Find line segments (Hough transform, contour tracking, …)
- Store information of these segments for further processing steps

Technical Proposal - Step 2 (3)



Note: Deep Learning Techniques | Image Processing Techniques | Image Processing & Object Detection Techniques

3 Polygons Detection

Output:

- Regions that contains the detected Polygons (have not recognized the type of polygon)

Technique: Image Processing & Object Detection

- Create a AI Model to find the regions of polygons in the image
  - Architecture: CNN
- Detected region will be classified later to find the type of polygon

4 Marks Detection

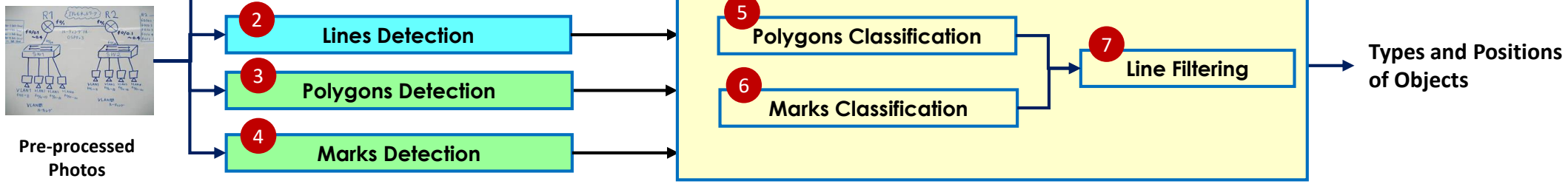
Output:

- Regions that contains the detected Marks (have not recognized the type of mark)

Technique: Image Processing & Object Detection

- Create a AI Model to find the regions of marks in the image
  - Architecture: CNN
- Detected region will be classified later to find the type of mark

Technical Proposal - Step 2 (4)



Note: Deep Learning Techniques | Image Processing Techniques | Image Processing & Object Detection Techniques

5 Polygons Classification

Output:

- Type of detected polygon

Technique: Deep Learning

- Create a DL Model to find the types of detected polygons
  - Architecture: CNN or SVM

6 Marks Classification

Output:

- Type of detected mark

Technique: Deep Learning

- Create a DL Model to find the types of detected marks
  - Architecture: CNN or SVM

7 Line Filtering

Output:

- Type of detected line

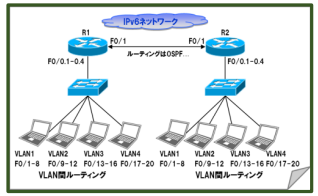
Technique: Deep Learning

- Keep the line segments which connect polygons or marks
- Create a DL Model to find the types of detected line segment
  - Architecture: SVM

Technical Proposal - Step 3

Recognized Objects (Types and Positions)

Step 3



Generated Layout

Overview

- **Target**
  - Generate the layout of the recognized objects
- **Input**
  - Recognized Objects (Types and Positions) in XML format
- **Output**
  - Layout of Recognized Objects in XML format

Description

Recognized Objects (Types and Positions)

XML Parser Library & Templates

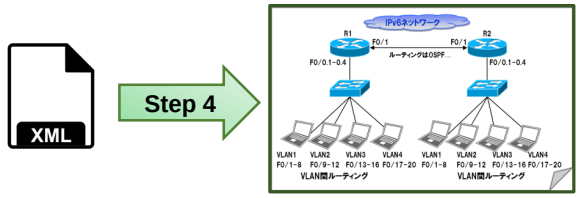
XML

XML file

Layout Generation

- Techniques: Create a XML Parser which use the public Library and Templates to generate the layout
- Output file will be in XML format that supports Microsoft Office

Technical Proposal - Step 4

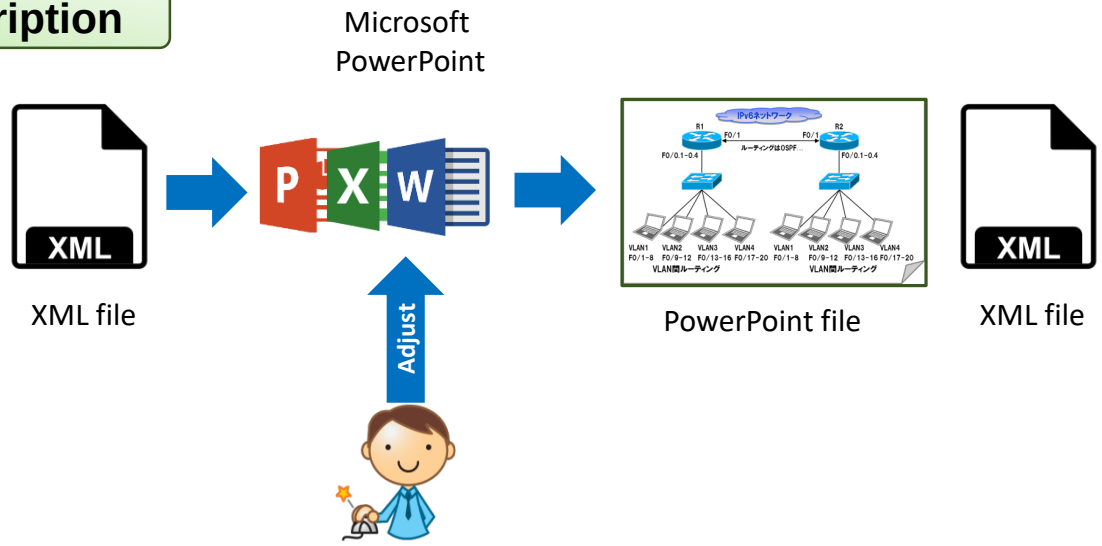


Final Layout

Overview

- **Target**
  - Adjust the Generated Layout by using Editor
- **Input**
  - XML file of Generated Layout
- **Output**
  - Final Layout

Description



Adjust Generated Layout

- User edits manually the layout by open XML file with Microsoft Office (e.g. PowerPoint, Microsoft Excel, Microsoft Word)
- Final Result can be saved as following formats:
  - Microsoft Office format
  - XML file

Proposed Scope & Deliverables for Version 1

Proposed Scope

Text

- English

Lines

- Straight Line

Polygons Detection

- Triangle, Rectangle, Circle

Marks Detection

- Not Implementing

Objects Classification

- 5 classes: Text, Line, Triangle, Rectangle, Circle

Deliverables

- Source code
- Data
- Technical Report
- Guideline

Development Environment

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Development

Image Processing

- Language: C++
- OpenCV
- Other libraries (If necessary)

Deep Learning

- Language: Python
- Framework: TensorFlow

Other

- XML libraries
- XML templates

Support Tools

Project Management

- Skype
- Slack
- Redmine
- Subversion

Estimation Effort

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Task	Sub-Task Level 1	Sub-Task Level 2	Effort (Man-Days)	AI Designer/Developer	Remarks	Effort (Man-Month)
AI Modules Development						
Pre-processing			10	Developer	- Remove redundant areas - Remove noise - Resize	9.875
Object Recognition	Text Recognition	Investigating Existing Deep Learning Solutions	10	Developer	End-to-end solution	
		Applying to recognize English	25	AI Designer	Focus only on 62 characters (26 uppercase, 26 lowercase letters, and 10 digits).	
		Applying to recognize Japanese	0	Developer	This feature is not implemented in version 1	
	Line Detection	Edges Extracting	5	Developer	For only straight lines which connect directly two objects	
		Line Segmentation	8	Developer		
		Post-processing	8	Developer	Combine the result of polygon classification	
	Polygons Detection	Data Creating	20	Developer	Creating labels is time-consuming	
		Model Design	7	AI Designer		
		Model Implementing	5	Developer		
		Training and Tuning	20	AI Designer		
	Marks Detection	Data Creating	0	Developer	This feature is not implemented in version 1	
		Model Design	0	AI Designer		
		Model Implementing	0	Developer		
		Training and Tuning	0	AI Designer		
	Objects Classification	Data Creating	20	Developer	Creating labels is time-consuming	
		Model Design	7	AI Designer		
		Model Implementing	5	Developer		
		Training and Tuning	20	AI Designer		
Layout Generation	Layout Generation	Investigate the XML format for Microsoft Office and XML libraries	8	Developer		
		Design solution making	10	Developer		
	XML Generation	Implementation	10	Developer		
Demo Development						
Requirement Analysis			8	Developer	Output is Q&A	2.7
AI Module Integration	Module Integration		15	Developer		
	GUI		15	Developer		
Simple Testing			6	Developer	Do the test for the demo scenarios	
Create Technical Report & Guideline			10	Developer	Technical Report focuses on the algorithms for each steps	
		Total (man-months)	**12.575**			
		Total Effort of AI Designer (man-months)	**3.95**			
		Total Effort of Developer (man-months)	**8.625**			

Estimation Cost

#	Role	Develop Effort		Unit Price (JPY)	Sub Total (JPY)	Note
		MD	MM			
1	Project manager	12.58	0.63	400,000	252,000	= 5% total develop effort
2	AI Designer	79.00	3.95	400,000	1,580,000	
3	Developer	172.50	8.63	280,000	2,416,400	
			Discount		**-258,400**	
			SUM		**3,990,000**	

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Thank you

Proposal for Image-2-Slide Demo App

Why Cloud Nine Solutions

Competitive Low TCO	We always commit: high quality output and result, on-time delivery, proactive communication and reports, add-in consultancy in technology, methodology and business domain. We “speak” client’s languages: English, Japanese, and Vietnamese (native).
End To End Value Chain	Key player in the entire IT service chain: consulting to implementation & support – system operation and maintenance service (from Level 2) – one-stop SW services: engineering, re-engineering, migrating, porting, customizing for Independent Software Vendors (ISVs).
People, Process & Technology	Certified resources pool, across various domains/technologies, coupled with investments in infrastructure, process excellence and technology partnerships - to ensure best-in-class solutions & services.
Repeat Business	Enduring relationships with fortune 100 & enterprise customers across Japan, UK and globally - as a result of consistent SLA based service delivery and process improvements.
Niche Solutions & Rich Experience	Niche solutions / real experience in the business verticals of logistics/location tracking, real estate management, property matching/recommendation, automotive, etc. Additionally, strong product development capabilities on multiple platforms.

Contact Us

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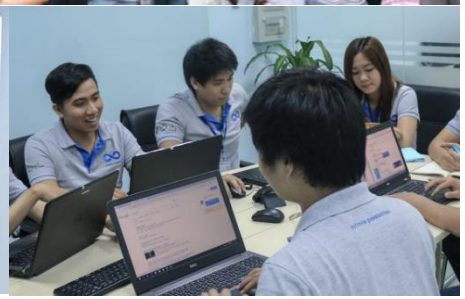
ONE TEAM – ONE VOICE – ONE VISION



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