1. Schematic diagram of vocation warehouse in the IT intelligent terminal product customer service and management occupational field

| **...** | ... | ... |
| --- | --- | --- |
| Level 4 | 1401 Maintenance technical supervisor  1402 Technical consulting supervisor | 2402 Customer experience center service supervisor |
| Level 3 | 1301 Service consultant  1302 Maintenance engineer |  |
| Vocational education classification | Technical support and service category (1) | Marketing and service management category (2) |
| IT intelligent terminal product customer service and management occupational field | |

1. Conceptual system of occupational content dimensions of BDMA

| O\*NET dimensions | Key indicator dimensions | Related content description |
| --- | --- | --- |
| Worker  Characteristics | Abilities | Analytical ability, logical reasoning ability, computer skills, system analysis and evaluation ability. |
| Occupational Interests | Interest in data analysis, information systems design and management. |
| Work values | Precision, independence, sense of achievement, innovation. |
| Work styles | Attention to detail, critical thinking, integrity, stress management. |
| Worker  Requirements | Skills | Data analysis, system design, programming languages, project management. |
| Knowledge | Information system management, database management, network security, and business process optimization. |
| Education | Degree in Computer Science, Information System Management, Data Science, Engineering Management or other related fields. |
| Experience  Requirements | Experience and Training | IT project management experience, system implementation experience, information security management experience. |
| Skills-Entry  Requirement | Familiar with industry standards (ISO, CMMI), laws and regulations (GDPR), technical certifications (CISSP, PMP, etc.). |
| Licensing | Technical certifications in specific fields, project management qualifications. |
| Occupational Requirements | Generalized Work Activities | Information system development and maintenance, database management, and network security management. |
| Detailed Work Activities | System requirements analysis, information resource planning, data backup and recovery, and technical support. |
| Organizational  Context | IT departments, technical consulting companies, information system departments. |
| Workforce  Characteristics | Labor Market Information | IT industry development trends, talent needs, and salary levels. |
| Occupational Outlook | Office environment, teamwork, highly information-based environment. |
| Occupation-Specific Information | Tasks | Information system planning and management, system integration, technical team leadership. |
| Technology Skills & Tools | Management information systems (ERP, CRM, etc.), database tools (Oracle, MySQL, etc.), programming tools (Python, etc.). |

1. The work activity system and keywords of the BDMA major

| Category | Work Activity | Keywords |
| --- | --- | --- |
| Information Input | Inspecting Equipment, Structures, or Materials | Performance testing, safety standards, technical specifications |
| Getting Information | Operational data, consumer demand, and technology research |
| Monitoring Process, Materials, or Surroundings | Organizational procedures, compliance, operational activities |
| Interacting With Others | Communicating with people outside the organization | Information provision, customer service, and notification of survey results |
| Communicating with Supervisors, Peers, or Subordinates | Operational communication, work negotiation, problem coordination, technical cooperation |
| Establishing and Maintaining Interpersonal Relationships | Professional relationship development, departmental collaboration, external collaboration |
| Interpreting the Meaning of Information for Others | Regulatory/policy interpretation, product technology, financial information |
| Selling or Influencing Others | Product promotion, service promotion, project promotion |
| Guiding, Directing, and Motivating Subordinates | Personnel activity supervision, information technology supervision, IT project management |
| Providing Consultation and Advice to Others | Technical support, system improvement, business operation suggestions |
| Training and Teaching Others | Operational training, safety standards, environmental compliance |
| Mental Processes | Analyzing Data or Information | Online data analysis, customer data, market research |
| Evaluating Information to Determine Compliance with Standards | Accuracy/compliance checks, document reviews, operational assessments |
| Processing Information | Data quality assessments, accuracy assessments |
| Developing Objectives and Strategies | Organizational policies, system development, technical procedures, technical standards |
| Making Decisions and Solving Problems | Method determination, resource requirements determination, organizational process implementation |
| Thinking Creatively | System development, applications, technical specifications, contingency plans |
| Work Output | Documenting/Recording Information | Data maintenance, technical learning material creation, contract preparation |
| Repairing and Maintaining Mechanical Equipment | Technical equipment maintenance, performance improvement, computer networks |
| Working with Computers | Programming, system security protection, system problem solving |
| Controlling Machines and Processes | Communication equipment operation, system operation |

1. Evaluation of the effectiveness of job-work activity scoring based on LLMs

| Dimension | Pearson's r | RMSE | MAE |
| --- | --- | --- | --- |
| Getting Information | 0.358 | 1.058 | 0.76 |
| Monitoring Process, Materials, or Surroundings | 0.664 | 0.735 | 0.54 |
| Inspecting Equipment, Structures, or Materials | 0.699 | 1.091 | 0.85 |
| Processing Information | 0.383 | 0.735 | 0.4 |
| Evaluating Information to Determine Compliance with Standards | 0.351 | 1.025 | 0.63 |
| Analyzing Data or Information | 0.554 | 0.883 | 0.46 |
| Making Decisions and Solving Problems | 0.574 | 0.707 | 0.38 |
| Thinking Creatively | 0.689 | 0.762 | 0.44 |
| Developing Objectives and Strategies | 0.667 | 0.894 | 0.58 |
| Controlling Machines and Processes | 0.761 | 0.837 | 0.52 |
| Working with Computers | 0.783 | 0.693 | 0.36 |
| Repairing and Maintaining Mechanical Equipment | 0.760 | 0.693 | 0.34 |
| Documenting/Recording Information | 0.422 | 0.843 | 0.49 |
| Interpreting the Meaning of Information for Others | 0.414 | 0.825 | 0.48 |
| Communicating with Supervisors, Peers, or Subordinates | 0.442 | 0.938 | 0.58 |
| Communicating with people outside the organization | 0.608 | 1.044 | 0.69 |
| Establishing and Maintaining Interpersonal Relationships | 0.714 | 0.557 | 0.31 |
| Selling or Influencing Others | 0.687 | 0.970 | 0.64 |
| Training and Teaching Others | 0.681 | 0.985 | 0.69 |
| Guiding, Directing, and Motivating Subordinates | 0.570 | 1.030 | 0.66 |
| Providing Consultation and Advice to Others | 0.612 | 0.854 | 0.47 |

1. Career Fields, Typical Jobs and Keywords of Work Activities for the DM Major

|  |  |  |  |
| --- | --- | --- | --- |
|  | Career Fields | Typical Jobs | Keywords of Work Activities |
| Engineering and  Technical Personnel | System/Equipment Maintenance | Operations Engineer | System Architecture Design, Fault Diagnosis and Emergency Response, Network Operation and Monitoring, Hardware Setup and Maintenance… |
| Internet Product Operations | IT Manager, Product Manager, New Media Operations Specialist, Marketing Specialist,  Operations Director | Market Strategy Development and Adjustment, Data-Driven Operations, Supply Chain Integration, Strategic Planning and Resource Coordination… |
| Technical Development & Data Engineering | Java Development Engineer, Data Analyst, Embedded Development Engineer, Algorithm Engineer, Test Engineer | Distributed System Development, Application of Artificial Intelligence and IoT Technologies, Support for Digital Transformation, Data Storage and Management… |
| Product Design & User Experience | UI Designer, Android Development Engineer, Front-End Development Engineer, Designer | User Needs Analysis, Product Prototyping and Visual Design, User Experience Optimization, Project Feasibility Study, Interaction Documentation Writing… |
| Information Transmission, Software, and IT Service Personnel | Technical Support & System Administration | System Engineer, Embedded Development Engineer, Operations Engineer, Test Engineer | Network Architecture Planning and Optimization, System Security Operations and Maintenance, Technical Solution Review, Program Development and Debugging… |
| Data Science & Algorithm Engineering | Data Analyst, Algorithm Engineer, Big Data Development Engineer, Data Governance Engineer, Data Mining Engineer | Machine Learning Modeling and Optimization, Big Data Governance and Cloud Service Integration, Data-Driven Decision Support, Algorithm Development, Data Monitoring and Business Value Extraction… |
| Product Management & Market Promotion | IT Manager, Product Manager, Marketing Specialist, IT Engineer, Operations Director | Market Trend Analysis and Strategy Design, Customer Needs Exploration and Relationship Management, Commercialization and Promotion of Technical Solutions, User Behavior Research… |
| Software Development & Design | Java Development Engineer, Software Engineer, Android Development Engineer, Front-End Development Engineer | Full-Stack System Architecture Design, Technical Solution Implementation and Evaluation, Server Performance Optimization, Standardization of Technical Documentation, Functionality Testing… |

1. Vocation Warehouse for “Engineering and Technical Personnel”

|  |  |  |
| --- | --- | --- |
| Level 3 (3.274) Education: Associate degree or higher  Experience: 4.5-10 years  Salary: ¥28,000/month | Total Demand Index: 1.518 | Total Demand Index：3.585 |
| 6||Operations Engineer, 3.406 | 8|| IT Manager, 3.837 |
| 15||Operations Engineer, 2.395 | 12|| Product Manager, 3.604 |
|  | 5|| Business Assistant, 3.592 |
|  | 24|| Product Manager, 3.551 |
|  | 18|| New Media Operations, 3.458 |
|  | 13|| Operations Director, 3.164 |
|  | 11|| Marketing Specialist, 2.875 |
| Level 2 (1)Education: No specific requirements (Vocational/Technical School, Junior High School, or below)Experience: 0-8 yearsSalary: ¥18,000/month | Total Demand Index: 1 | Total Demand Index: 1.64 |
| 15||Operations Engineer, 2.893 | 18|| New Media Operations, 2.613 |
| 6||Operations Engineer, 2.324 | 11|| Marketing Specialist, 2.195 |
|  | 13|| Operations Director, 2.067 |
|  | 24|| Product Manager, 1.87 |
|  | 5|| Business Assistant, 1.836 |
|  | 8|| IT Manager, 1.812 |
|  | 12|| Product Manager, 1.723 |
| Level 1 (5)Education: High school or aboveExperience: 0-4 yearsSalary: ¥15,000/month | Total Demand Index: 3.291 | Total Demand Index: 4.448 |
| 6||Operations Engineer, 4.783 | 18|| New Media Operations, 4.529 |
| 15||Operations Engineer, 3.642 | 11|| Marketing Specialist, 4.166 |
|  | 24|| Product Manager, 4.147 |
|  | 13|| Operations Director, 4.044 |
|  | 5|| Business Assistant, 4.018 |
|  | 12|| Product Manager, 3.994 |
|  | 8|| IT Manager, 3.878 |
| vertical stratification/horizontal classification | System/Equipment Maintenance(1) | Internet Product Operations(3.96) |

Vocation Warehouse for “Engineering and Technical Personnel”(Continued)

|  |  |  |
| --- | --- | --- |
| Level 3 (3.274) Education: Associate degree or higher  Experience: 4.5-10 years  Salary: ¥28,000/month | Total Demand Index: 3.856 | Total Demand Index：2.548 |
| 21|| Java Development Engineer, 4.146 | 9|| Android Development Engineer, 3.526 |
| 23|| Test Engineer, 3.948 | 19|| UI Designer, 3.197 |
| 22|| Front-End Development Engineer, 3.94 | 4|| Front-End Development Engineer, 3.108 |
| 20|| Embedded Development Engineer, 3.694 | 17|| Designer, 3.083 |
| 3|| Data Analyst, 3.311 | 7|| Marketing Specialist, 2.165 |
| 2|| Data Analyst, 3.217 |  |
| 10|| Algorithm Engineer, 3.187 |  |
| 14|| Full-Stack Development Engineer, 2.96 |  |
| 1|| Database Administrator (DBA), 2.951 |  |
| 16|| Data Analyst, 2.893 |  |
| 0|| Algorithm Engineer, 2.651 |  |
| Level 2 (1)Education: No specific requirements (Vocational/Technical School, Junior High School, or below)Experience: 0-8 yearsSalary: ¥18,000/month | Total Demand Index: 1.736 | Total Demand Index: 2.039 |
| 21|| Java Development Engineer, 2.434 | 17|| Designer, 3.336 |
| 16|| Data Analyst, 2.366 | 7|| Marketing Specialist, 2.954 |
| 3|| Data Analyst, 2.23 | 19|| UI Designer, 2.466 |
| 23|| Test Engineer, 2.149 | 9|| Android Development Engineer, 2.084 |
| 22|| Front-End Development Engineer, 1.975 | 4|| Front-End Development Engineer, 1.984 |
| 10|| Algorithm Engineer, 1.903 |  |
| 20|| Embedded Development Engineer, 1.433 |  |
| 14|| Full-Stack Development Engineer, 1.306 |  |
| 2|| Data Analyst, 1.282 |  |
| 1|| Database Administrator (DBA), 1.065 |  |
| 0|| Algorithm Engineer, 1 |  |
| Level 1 (5)Education: High school or aboveExperience: 0-4 yearsSalary: ¥15,000/month | Total Demand Index: 5 | Total Demand Index: 4.173 |
| 21|| Java Development Engineer, 5 | 17|| Designer, 4.455 |
| 23|| Test Engineer, 4.744 | 9|| Android Development Engineer, 4.447 |
| 10|| Algorithm Engineer, 4.665 | 19|| UI Designer, 4.38 |
| 3|| Data Analyst, 4.573 | 4|| Front-End Development Engineer, 4.319 |
| 20|| Embedded Development Engineer, 4.485 | 7|| Marketing Specialist, 4.17 |
| 22|| Front-End Development Engineer, 4.261 |  |
| 16|| Data Analyst, 4.136 |  |
| 1|| Database Administrator (DBA), 3.859 |  |
| 2|| Data Analyst, 3.783 |  |
| 0|| Algorithm Engineer, 3.664 |  |
| 14|| Full-Stack Development Engineer, 3.406 |  |
| vertical stratification/ horizontal classification | Technical Development & Data Engineering(5) | Product Design & User Experience(3.069) |

1. Vocation Warehouse for “Information Transmission, Software, and IT Service Personnel”

|  |  |  |
| --- | --- | --- |
| Level 3 (3.274) Education: Associate degree or higher  Experience: 4.5-10 years  Salary: ¥28,000/month | Total Demand Index: 3.052 | Total Demand Index: 3.217 |
| 20|| System Engineer, 4.339 | 18|| Data Analyst, 3.387 |
| 17|| Embedded Development Engineer, 4.105 | 25|| Algorithm Engineer, 3.626 |
| 12|| Operations Engineer, 3.813 | 32|| Data Analyst, 3.452 |
| 2|| Database Administrator (DBA), 3.751 | 3|| Big Data Development Engineer, 3.375 |
| 24|| Test Engineer, 3.518 | 33|| Data Governance Engineer, 3.362 |
| 4|| Operations Engineer, 3.177 | 19|| Full-Stack Development Engineer, 3.351 |
|  | 11|| Data Mining Engineer, 3.344 |
|  | 16|| Data Analyst, 3.319 |
|  | 22|| Algorithm Engineer, 3.304 |
|  | 28||Algorithm Engineer, 2.544 |
| Level 2 (1)Education: No specific requirements (Vocational/Technical School, Junior High School, or below)Experience: 0-8 years Salary: ¥18,000/month | Total Demand Index: 1.173 | Total Demand Index: 1 |
| 4|| Operations Engineer, 3.596 | 32|| Data Analyst, 3.144 |
| 12|| Operations Engineer, 2.92 | 18|| Data Analyst, 2.987 |
| 20|| System Engineer, 2.617 | 11|| Data Mining Engineer, 2.594 |
| 24|| Test Engineer, 2.582 | 25|| Algorithm Engineer, 2.431 |
| 2|| Database Administrator (DBA), 2.518 | 19|| Full-Stack Development Engineer, 2.113 |
| 17|| Embedded Development Engineer, 2.348 | 22|| Algorithm Engineer, 2.03 |
|  | 16|| Data Analyst, 1.778 |
|  | 3|| Big Data Development Engineer, 1.683 |
|  | 33|| Data Governance Engineer, 1.504 |
|  | 28|| Algorithm Engineer, 1 |
| Level 1 (5)Education: High school or aboveExperience: 0-4 years Salary: ¥15,000/month | Total Demand Index: 4.562 | Total Demand Index: 4.632 |
| 12|| Operations Engineer, 5 | 18|| Data Analyst, 4.872 |
| 20|| System Engineer, 4.757 | 25|| Algorithm Engineer, 4.798 |
| 17|| Embedded Development Engineer, 4.737 | 32|| Data Analyst, 4.423 |
| 24|| Test Engineer, 4.586 | 11|| Data Mining Engineer, 4.396 |
| 2|| Database Administrator (DBA), 4.426 | 22|| Algorithm Engineer, 4.14 |
| 4|| Operations Engineer, 4.221 | 3|| Big Data Development Engineer, 4.059 |
|  | 16|| Data Analyst, 3.903 |
|  | 33|| Data Governance Engineer, 3.68 |
|  | 19|| Full-Stack Development Engineer, 3.589 |
|  | 28|| Algorithm Engineer, 3.446 |
| vertical stratification/ horizontal classification | Technical Support & System Administration(1) | Data Science & Algorithm Engineering(1.757) |

Vocation Warehouse for “Information Transmission, Software, and IT Service Personnel”(Continued)

|  |  |  |
| --- | --- | --- |
| Level 3 (3.274) Education: Associate degree or higher  Experience: 4.5-10 years  Salary: ¥28,000/month | Total Demand Index: 3.854 | Total Demand Index: 3.274 |
| 1||IT Manager, 4.368 | 14||Java Development Engineer, 4.313 |
| 23||Product Manager, 4.15 | 15||Android Development Engineer, 4.047 |
| 29|| Business Assistant, 4.145 | 8||Software Engineer, 3.884 |
| 0||Product Manager, 4.133 | 21||UI Designer, 3.825 |
| 26|| New Media Operations, 4.036 | 10|| Designer, 3.749 |
| 30|| Operations Director, 3.815 | 5|| Front-End Development Engineer, 3.747 |
| 9||Marketing Specialist, 3.61 | 31||Java Development Engineer, 3.048 |
| 6||IT Engineer, 3.03 | 27|| Marketing Specialist, 3.006 |
| Level 2 (1)Education: No specific requirements (Vocational/Technical School, Junior High School, or below)Experience: 0-8 years Salary: ¥18,000/month | Total Demand Index: 1.569 | Total Demand Index: 2.172 |
| 26|| New Media Operations, 3.362 | 10|| Designer, 3.963 |
| 9||Marketing Specialist, 3.065 | 27||Marketing Specialist, 3.626 |
| 30|| Operations Director, 2.913 | 21||UI Designer, 3.244 |
| 29|| Business Assistant, 2.861 | 15||Android Development Engineer, 2.913 |
| 0||Product Manager, 2.76 | 14||Java Development Engineer, 2.892 |
| 1||IT Manager, 2.693 | 5|| Front-End Development Engineer, 2.846 |
| 23||Product Manager, 2.683 | 8||Software Engineer, 2.651 |
| 6||IT Engineer, 1.629 | 31||Java Development Engineer, 2.03 |
| Level 1 (5)Education: High school or aboveExperience: 0-4 years Salary: ¥15,000/month | Total Demand Index: 4.852 | Total Demand Index: 5 |
| 26|| New Media Operations, 4.899 | 14||Java Development Engineer, 4.942 |
| 9|| Marketing Specialist, 4.6 | 10|| Designer, 4.834 |
| 0||Product Manager, 4.579 | 21||UI Designer, 4.767 |
| 30|| Operations Director, 4.498 | 8||Software Engineer, 4.753 |
| 29||Business Assistant, 4.486 | 5||Front-End Development Engineer, 4.714 |
| 23||Product Manager, 4.454 | 15||Android Development Engineer, 4.703 |
| 1||IT Manager, 4.411 | 27||Marketing Specialist, 4.613 |
| 6||IT Engineer, 3.547 | 31||Java Development Engineer, 4.129 |
| vertical stratification/ horizontal classification | Product Management & Market Promotion(4.951) | Software Development & Design(5) |

1. Job Description for Algorithm Engineer in Engineering and Technical Personnel

|  |  |  |
| --- | --- | --- |
| 0||Algorithm Engineer (2.651) | Horizontal Category: Technical Development & Data Engineering (1) | Vertical Level: Level 3 (3.274) |
| Skill  Requirements | Basic Knowledge & Competencies | 1. Proficient in various machine learning algorithms and their principles. 2. Familiar with one or more mainstream deep learning frameworks. 3. Capable of independently conducting related R&D work. |
| Communication | Strong teamwork spirit and communication skills. |
| Technical Capabilities | 1. Responsible for system architecture design and project delivery. 2. Select and optimize algorithms based on business scenarios, and promote the application of AI technologies (NLP, computer vision, health management, etc.) in big data platforms. |
| Research & Development Capabilities | 1. Regularly design and implement optimization solutions to deploy and iteratively improve algorithm models. 2. Continuously enhance models through sample optimization, feature engineering, model architecture adjustments, and other approaches. |
| Work Activities | Working with Computers | 1. Promote the implementation of large models/deep learning in fields such as cybersecurity. 2. Design and optimize big data algorithm models, complete modular system architecture and performance optimization. 3. Prepare development documentation and project proposals. |
| Communicating with Supervisors, Peers, or Subordinates | 1. Collaborate with teams to refine AI algorithms and drive product iteration and commercialization. 2. Support business development teams to achieve product commercialization goals. |
| Thinking Creatively | 1. Explore cutting-edge technologies such as LLM training, reinforcement learning, and time-series mining. 2. Participate in machine learning R&D and promote the engineering application of innovative technologies. |
| Training and Teaching Others | Prepare documentation on research outcomes and conduct regular internal team training sessions. |
| Making Decisions and Solving Problems | Formulate development plans, oversee development process management, and implement progress control and quality checks. |

1. Job Description for Product Manager in “Information Transmission, Software, and IT Service Personnel”

|  |  |  |
| --- | --- | --- |
| 0||Product Manager (4.133) | Horizontal Category: Product Management & Market Promotion (4.951) | Vertical Level: Level 1 (5) |
| Skill  Requirements | Basic Knowledge & Competencies | 1. Proficient in data processing, business modeling, and visualization capabilities; able to independently deliver data analysis reports. 2. Familiar with the full product life cycle, including market analysis, requirement design, user research, etc. 3. Skilled in product prototyping and able to independently complete workflow and interface design. |
| Communication | 1. Collaborate with clients to formulate product strategies and drive implementation. 2. Extract user requirements and coordinate teams to execute data-driven conclusions. |
| Tool Proficiency | 1. Ability to interpret technical documentation and software architectures for efficient collaboration with engineers. 2. Proficient in product design tools (e.g., Axure, Sketch) and project management tools (e.g., Jira). |
| Product Management & Strategic Planning | 1. Responsible for product roadmap development and industry-specific solutions to support market expansion. 2. Participate in strategic planning, conduct business analysis, competitive benchmarking, and goal tracking. |
| Data Analysis & Decision Support | 1. Investigate business directions, identify risks/opportunities through data insights, and drive business implementation. 2. Analyze user behavior data to optimize product strategies and user experience. |
| Work Activities | Working with Computers | 1. Lead requirements analysis for CRM, ERP, and other enterprise products; design business processes and prototypes. 2. Prepare product documentation and collaborate with teams to define product roadmaps. |
| Communicating with Supervisors, Peers, or Subordinates | 1. Develop project plans, coordinate cross-functional teams (business, operations, technical), and monitor project progress. 2. Deliver regular project status updates. |
| Thinking Creatively | 1. Evaluate product performance, analyze user needs and data, draft PRDs (Product Requirement Documents), and drive iterations. 2. Stay updated on industry trends and explore emerging technologies/innovations. |
| Training and Teaching Others | Provide customer training support and proactively acquire training content/methodologies. |
| Making Decisions and Solving Problems | 1. Lead new product planning and feasibility analysis, optimize product workflows. 2. Monitor competitor strategies and propose actionable solutions. |